CONTRIBUTIONS TO THE HISTORY OF NORTH AMERICAN ORNITHOLOGY

VOLUME II

Edited by

WILLIAM E. DAVIS, JR.
and
JEROME A. JACKSON

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CONTRIBUTIONS TO THE HISTORY OF NORTH AMERICAN ORNITHOLOGY

VOLUME II

MEMOIRS OF THE NUTTALL ORNITHOLOGICAL CLUB, NO. 13

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Preface

This book is the second in a series that had its genesis in a symposium on the history of North American ornithology at the 1991 annual meeting of the Association of Field Ornithologists at Ohio Wesleyan University. The first volume, published in 1995, is an eclectic assortment of contributed chapters, with contributions to ornithology ranging from museums, universities, and governmental agencies, to historical essays on biogeography, Alexander Wilson, Canadian ornithology, and a chapter on the literature of the history of ornithology. For a variety of reasons, including space limitations, there were major omissions in our coverage, in particular, several major academic institutions and museums with long and prominent histories in ornithology. Hence, we decided to invite chapters for this second volume. In addition to institutional histories, we have included several chapters on professional organizations, a Canadian governmental agency, and personal recollections. Time constraints resulted in several omissions so that several major "holes" remain in our institutional coverage. We hope to rectify this situation by compiling a third volume.

We have placed institutional chapters at the beginning of the book, and approximately in the order in which the institutions were founded. Then follow the chapters on professional organization and more general subjects.

As in the first volume, most of the chapters are "court histories," written by people who participated in making the history they write about. We continue to believe that despite the potential for bias, these "insiders" historical accounts are important because of the insights provided through personal experience and intimate knowledge of the subject matter. Most of these histories are more descriptive than interpretive and thus provide information necessary for future historical synthesis. We thus hope that the essays of this volume will have heuristic value as well as providing interesting reading.

We thank all our authors for their patience and good will during the editing phase, and our constant harassment about deadlines.

WED

JAJ

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1

Ornithology at the University of Michigan Museum of Zoology: An Historical Account

Robert B. Payne[1]

ABSTRACT.—The Division of Birds of the University of Michigan Museum of Zoology (UMMZ) is a center for the study of birds. Its research collections have been built through 160 years of fieldwork with birds in Michigan and around the world. Its curators have directed the Ph.D. research programs of 54 graduate students, and other academics have directed additional Ph.D. programs in avian research. The history and nature of the collections with its 200,000 bird specimens, together with the development of research facilities and a tradition of academic research and publication in ornithology, are highlighted by accounts from biographies of the curators, collectors, alumni and friends, and by the research programs of the curators and their encouragement and nurturing of new generations of ornithology students.

The University of Michigan Museum of Zoology (UMMZ) is located in the Ruthven Museums building near the center of the campus in Ann Arbor. UMMZ shares the building with the Museum of Anthropology, the Museum of Paleontology, and the Exhibits Museum. Just over half of the UMMZ space is dedicated to collections; other space is used for offices, laboratories, and libraries. The museum has 13 curators, all of whom are Ph.D. academics interested in evolutionary biology and who do research with the groups (insects, mollusks, fish, herps, mammals and birds) that comprise over 90% of the earth's animal species. UMMZ is both a research unit and a center for the education and research experience of graduate students.

[1] Museum of Zoology
University of Michigan
Ann Arbor, Michigan 48109-1079

Collections are available to the scientific community and are also used by amateurs. Graduate classes are taught in the museum to make use of the research collections, and more undergraduate classes are taught in the Biology Department, where the curators hold professorial appointments in addition to their appointments in the museum. The museum building was most recently added to with a new wing with the support of the National Science Foundation in 1964, through the efforts of UMMZ Director T. H. Hubbell. The Exhibits Museum has public displays that include most Michigan birds; UMMZ Curators are not directly involved in the public programs of the museum. Long-term ecological research and field studies of several curators, professors, and graduate students are carried out 25 miles from Ann Arbor at the E. S. George Reserve, a 600-ha natural history research area of upland woods, old fields, and swamps that is used for field studies by biologists and is administered by UMMZ.

The UMMZ Division of Birds has been the center of ornithological studies at the University of Michigan. These curators have assembled a collection of skins and skeletal specimens that is a remarkable record of diversity representing 66% of all species of birds of the world. The museum libraries contain an excellent collection of research books and more than 200 current ornithological journals. The laboratory facilities include aviaries for breeding and sound analysis laboratories for studies of song development and species diversity in behavior. In 1984 a multi-user laboratory of molecular systematics was set up in the museum, and in 1995 a laboratory of avian molecular genetics was established. The Division of Birds promotes the employment of scientific ornithologists, serves as a center for innovative research and for documentation of the diversity of birds of the world, and provides opportunities for graduate research and scientific training in addition to traditional systematic studies.

The history of the Division of Birds can be characterized by three overlapping periods of growth and development: first, founding of the collections as regionally and internationally important resources; second, growth of the collections through the period of Curator J. Van Tyne; and third, development of scientific and graduate research. Each period was marked by accomplished curators who were professional naturalists, students who worked with them, and successful administrators who supported and directed them.

Abbreviations for museums mentioned in the chapter are: AMNH, American Museum of Natural History (New York); BMNH, British Museum (Natural History); CAS, California Academy of Sciences; FMNH, Field Museum of Natural History (Chicago); MCZ, Museum of Comparative Zoology, Harvard University; MVZ, Museum of Vertebrate Zoology, University of California (Berkeley); UMMZ, University of Michigan Museum of Zoology; USNM, National Museum of Natural History (Washington, D.C.).

THE BEGINNINGS OF THE MUSEUM OF ZOOLOGY AND THE STUDY OF ORNITHOLOGY: 1837 TO 1900

The early history of the museum was described by Winchell (1864), by accounts in the university *Annual Reports* (Ruthven 1910, Wood 1919), and in the *Ark*, an in-house museum publication of 1922–1932. The first bird specimens acquired by the museum were from Michigan, then birds from the more remote parts of North America were added through friends of the University, and the first overseas acquisitions arrived with the birds collected during the around-the-world expedition of naturalist J. B. Steere.

Development of the collections began shortly after Michigan became a state in 1837, and the legislature created the Michigan Geological Survey (McVaugh 1970). Henry Rowe Schoolcraft introduced legislation to found the University of Michigan and provide for a university natural history museum: "The board of regents shall have authority to expend so much of the interest arising from the University fund as may be necessary for the purchase of Philosophical and other apparatus, a library and Cabinet of Natural History" (Ruthven 1910). Abram Sager (Fig. 1), a medical doctor, made the first collections of birds when he worked with the Geological Survey as State Zoologist (1837–1839). He published the first list of Michigan birds (Sager 1839) and deposited 705 bird specimens in the university collection; 20 are still in the museum. He was the first resident professor of Botany and Zoology (1842–1855).

In 1855 the University established the museum as the Cabinet of Natural History and appointed Alexander Winchell as Professor. The collections were under his charge from 1855 until 1873. From 1864 to 1881 the museum was known as the Museum of the University of Michigan, or MUM (Roth 1891, Adams 1905). During Winchell's tenure, the Smithsonian Institution gave the University a collection including birds from other parts of North America. William Petit Trowbridge, a nonresident professor at the University from 1856 to 1857, collected for the U.S. Coast Survey in California, and arranged to send specimens from the National Museum to the University. The Trowbridge Collection included 283 bird skins and 85 sets of eggs (Winchell 1861) and was examined for Baird's (1858) report on the birds of western North America. When received, the specimens were recorded in the university museum's Catalogue #1 (ca. 1861); about half of these remained when specimens were re-entered in Catalogue #2

Fig. 1. Abram Sager, ca. 1850 (Ruthven 1910).

(ca. 1887). Along with the Trowbridge Collection the museum received 127 birds from arctic and subarctic North America taken for the Smithsonian by Robert Kennicott (Preble 1908, Mearns and Mearns 1998). In 1859-1860 the Michigan Geological Survey was encouraged to collect additional natural history specimens within the state and to deposit a set in the University (Winchell 1864). In 1863, when the museum had 1291 bird specimens, more than half (748) were from Sager's state survey of 1837-1838 and the remainder were nearly all from the Trowbridge and Kennicott collections (Winchell 1864). Unfortunately, many of these early birds did not have locality and date of collection data, and so were of limited value for research. Most were later given to schools for teaching or were discarded and replaced by more recently collected specimens. Only 21 Trowbridge specimens were located in the museum in 1997. The loss occurred both before 1892 when Catalogue #4 was begun and during the first decades of the 1900s.

In this early period of natural history, the goal was to have a large diversity of species represented in the collection. "Duplicates" were traded and sometimes even discarded because geographic variation or site-specific individual variation was not recognized as important. Also, specimens became worn and more recently collected birds were regarded as replacements of the older "duplicates." Today we recognize that each bird specimen is unique and offers individual information, especially when it has a well-documented label. The need to collect large series over the years and across geographic ranges (Miller 1985, Remsen 1995, Jardine et al. 1996) was not appreciated until later, when geographic variation and the description of subspecies led to the development of speciation theory and Ernst Mayr's papers and books, all the results of extensive museum collections of birds (Mayr 1942, 1963).

Joseph Beal Steere (1842–1940) naturalist and traveler, collected in the New World and Old World tropics and his collections transformed the University museum into a world-class institution of natural history. After attending high school in Ann Arbor, Steere graduated from the Literary Department of the University in 1868 and the Law School in 1870. In 1870 at the age of 28, influenced by the classic travel book *The Naturalist on the River Amazons* (Bates 1863), Steere left to travel around the world. He was encouraged by Winchell and had financial backing from his mother's cousin, Rice A. Beal, owner and publisher of the Ann Arbor *Courier*, a weekly newsletter, while Beal received publication rights on Steere's travel stories in return. Steere traveled in Brazil up the Amazon for nearly two years, crossed the Andes, then continued into Peru and Ecuador (he collected 911 birds in South America (Sclater and Salvin 1878)), visited China, traveled in Taiwan (Steere 1874), and collected in the Philippines, Sulawesi, and the Moluccas before returning by way of Singapore, Malacca, Suez, and London (Gaige 1932). He was in the Philippines from June 1874 to April 1875, when he found many previously unknown birds [see also Preston and Haglund, this volume p. 139]. Steere also collected mammals, mollusk shells, fossils, plants, and cultural artifacts. He used local hunters in Mindanao; in Sulawesi (Celebes), the Moluccas (Ternate, Halmahera), and Malacca he purchased birds at markets. The Philippine collection has been examined in detail (Dickinson et al. 1991), but other Steere collections have not and are of less interest as sources of new taxa because the areas represented had been intensively collected before Steere's visits (Wallace 1869, White and Bruce 1986, Sick 1993). Steere published parts of his itinerary in a series of 96 letters (Steere 1870-1876), and excerpts later were published in Steere (1938). Van Steenis-Kruseman (1950) published an itinerary, and a revised itinerary (unpublished, available in the museum) was worked out in 1964 by Museum Director T. H. Hubbell from the *Courier* letters and other sources in the museum.

In 1876, Steere visited the BMNH in London with his specimens, where Sharpe identified many birds, which now bear Sharpe's identifications on their labels in UMMZ. Sharpe (1876, 1877) published on the Steere Philippine collection, including Steere's field notes, and described 33 new species, Swinhoe (1877) described a new species that Steere collected in Taiwan, and Sclater and Salvin (1878) published on Steere's South American birds and described five new species. Of the 39 new birds from Steere's expedition, the type specimens of 34 are in UMMZ (Adams 1905, Storer 1988), four are in BMNH (Warren 1966, Warren and Harrison 1971), and one (a cuckoo *Dryococcyx harringtoni*) has not been found (Dickinson et al. 1991).

Steere's collection included 3188 bird specimens in MUM as listed in the undated Beal-Steere catalogue (Catalogue #3). In 1892, Catalogue #4 listed 1616 Beal-Steere birds. In 1997 more than half of these were located in the museum, including 513 from Brazil and 158 from the Philippines. Other birds with Beal-Steere labels and from places Steere did not visit (Africa, India, Sri Lanka, Japan, New Guinea, New Zealand, Australia) were received from the BMNH through Sharpe and Salvin, exchanged with R. E. Dresser who was at BMNH when Steere visited in 1876, and purchased from E. Gerrard, a natural history agent at BMNH (Sharpe 1906).

From June to September 1879, Steere made a second expedition to Brazil with a party of students including Edward M. Brigham. From the 1879 trip, Steere catalogued 21 birds in MUM (19 are now in UMMZ), with two others taken by Brigham, who returned to Brazil to collect in 1881, 1882, and 1883. Accounts of Steere's Brazil collections are available only in his letters from the first expedition and in Brodkorb (1937).

In 1887, Steere carried out a second expedition to the Philippines with five former students including Frank S. Bourns, Edwin L. Moseley, and Dean C. Worcester, and with Mateo Francisco, who had accompanied Steere from the Philippines on his first expedition and returned with him to Ann Arbor (Fig. 2). The group collected about 5000 birds from August 1887 to July 1888 (Steere 1890, 1891a, 1894; Dickinson et al. 1989). Steere's 1890 account listed 367 kinds of birds, 53 as new species. The type specimens he sold to BMNH (Warren 1966, Warren and Harrison 1971, Dickinson et al. 1991). From this expedition, UMMZ currently has 48 spec-

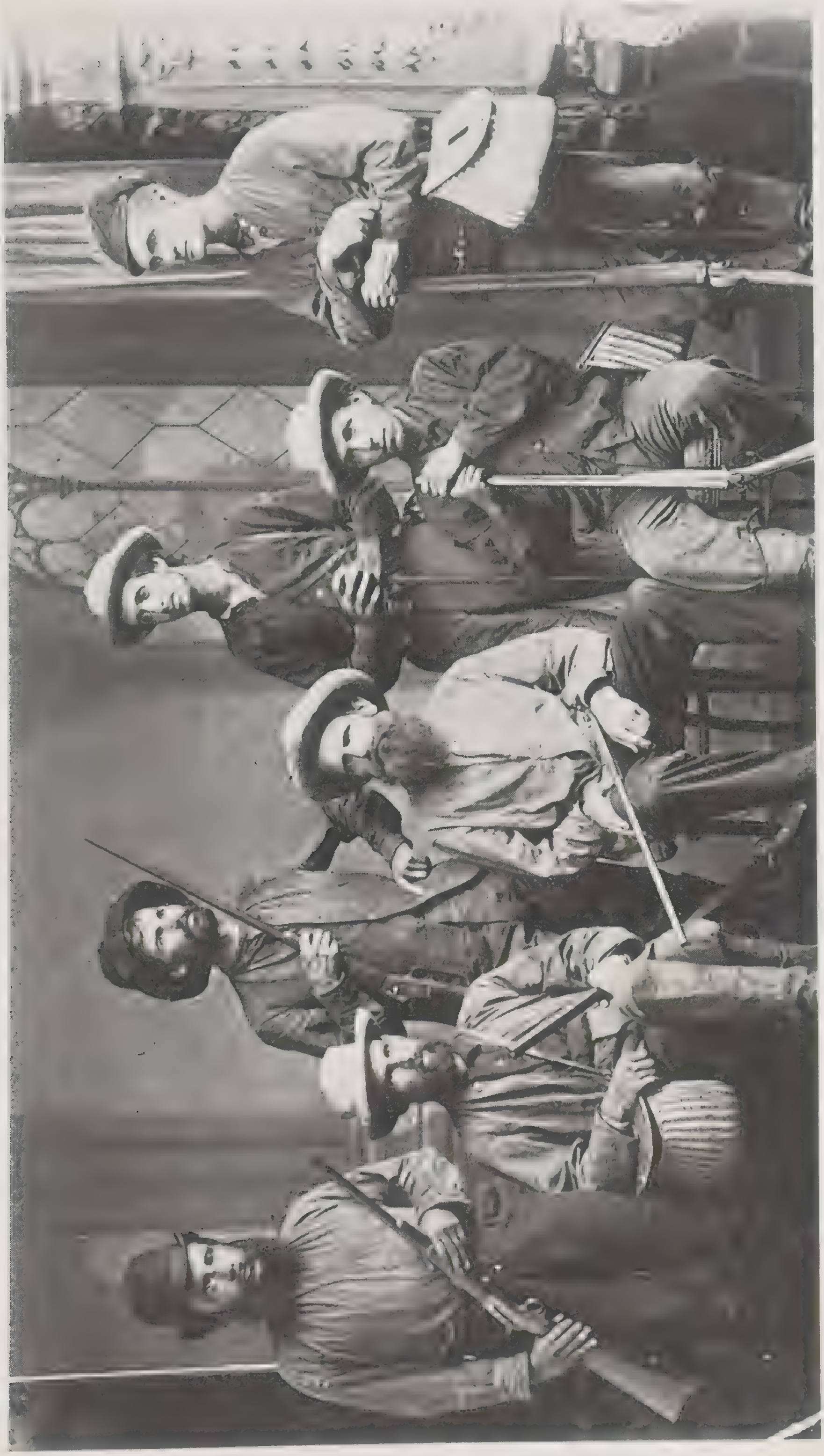

Fig. 2. Joseph B. Steere and his collecting team in the Philippines, 1887. Left to right: Back row: Mateo Francisco, E. L. Moseley, and two other students from Michigan; front row: D. C. Worcester, J. B. Steere, F. S. Bourns. Courtesy J. B. Steere Collection, Bentley Historical Library, University of Michigan.

imens taken by Steere and 59 by Worcester, Bourns, and Moseley. The former students withheld other specimens, some which they described as new and many which they sold. Bourns and Worcester collected in later years in the Philippines and Borneo with the Menage Scientific Expedition in 1890-1893 (Bourns and Worcester 1894, Worcester and Bourns 1898, Dickinson et al. 1989, 1991). Many went to the University of Minnesota, where more than 1000 of these bird specimens are now in the Museum of Natural History (Broderick 1997). Moseley published on the Steere trip (Moseley 1891), built up a bird collection, and was a professor at Bowling Green State University, Ohio, where his collections remain (Niederhofer 1988). Steere himself sold many "duplicates" from his collection, including 2727 Philippine birds to BMNH (Sharpe 1906). In addition to the South American and Philippine birds taken by Steere and his students, another 1099 Asian bird specimens collected by Steere and 92 Philippine bird specimens collected by Worcester and Bourns for the Menage Expeditions are now in UMMZ.

Steere birds often lack dates or localities on the labels. Original data have been recovered through serial numbers where present. The serial number is a four-digit number written on the label without a letter prefix. This number is in Catalogue #3 and is also known as the Beal-Steere number; the number is lacking from birds from other Steere expeditions and is useful in tracing the date and locality of the specimens. Other numbers prefixed B were added after the birds were unpacked, this is the "original number" in Storer (1988). None of these specimen numbers appeared in the descriptions of new species (Sharpe 1877, Sclater and Salvin 1878), and the numbers were apparently added later. Certain specimens have only the large manila "Beal-Steere" labels that were added in Ann Arbor to birds that Steere collected in the field and to specimens he received in purchase and exchange, MUM labels that were with the mounted birds, or UMMZ labels that were added in the 1930s when the mounted birds were remade into study skins.

In 1875, while he was at sea, the University awarded its first honorary Doctorate of Philosophy degree to Steere for his published letters. After he returned, in 1878 Beal and Steere transferred their interest in the specimens known as the "Beal-Steere Collection" to the University, and when the University Regents recognized financial irregularities in 1879 they struck Beal's name from the collection, which was to be known as the "Steere Collection." Steere was Curator of the MUM from 1876 to 1881 and Curator of the zoological collections from 1881 to 1894 (Wood 1919), and he also held an appointment as Professor. He was asked to resign in 1894. According to Steere's letters in the museum archives, he brought about his own fall through his activist politics—he campaigned for abstinence from drink (Steere 1891b). Both D. C. Worcester and N. A. Wood were appointed to the museum in the following year. Steere's last trip, in 1901 to the Amazon, with Brigham, was supported by the Smithsonian. Steere then farmed near Ann Arbor, lost the farm when the city of Ann Arbor took it over for their water supply, then lived with relatives until he died in 1940, age 98 years.

Steere had a lasting effect both on the University museum and on historical processes at the international level, as his student, Worcester, was Secretary of the Interior of the Government of the Philippines. At Michigan, Steere's collections revived interest in the museum and led to construction of a new building. "Michigan was the first state university to recognize the need of a museum building to centralize the research and educational functions of organized scientific collections" (*Michigan Daily*, 6 November 1938). It was first occupied in 1881.

GROWTH OF THE MUSEUM AND THE BIRD COLLECTIONS: 1894 TO 1945

From 1881, there were six museums in the new museum building, including the Museum of Natural History (the name of the museum where the birds were located, from 1881 to 1913), which had collections of zoology and botany as well as archaeology, geology, and ethnology. The other museums were collections of fine arts and history, applied chemistry, medicine and surgery, homeopathic medicine, and dental surgery. Each museum was headed by a Professor whose main commitment was to teaching; his curation of the collection was a secondary concern (Ruthven 1910). Thus when Jacob Reighard succeeded Steere in 1894 as head of the Museum of Natural History, the arrangement remained as it had been with Steere, for one person to be both a teaching professor and a curator of the collection. From 1895 to 1898, D. C. Worcester was Curator and Assistant Professor, and in 1898, H. E. Sargent was appointed Curator to develop the exhibit: "the policy of the period was that the first object of the Museum should be the entertainment and instruction of the public" (Wood 1919). Reighard remained head, now termed Director, of the museum. Charles C. Adams was appointed Curator in 1903; the museum had a staff of four: Adams, Reighard (Professor of Zoology and Director of the Zoological Museum), N. A. Wood (Taxidermist), and E. H. Frotheringham (Assistant). Adams, an active and dedicated scientist, had completed a master's degree at Harvard. He worked at Michigan with the collection (Adams 1905) and with avian ecology (references in Barrows 1912) and directed the resources

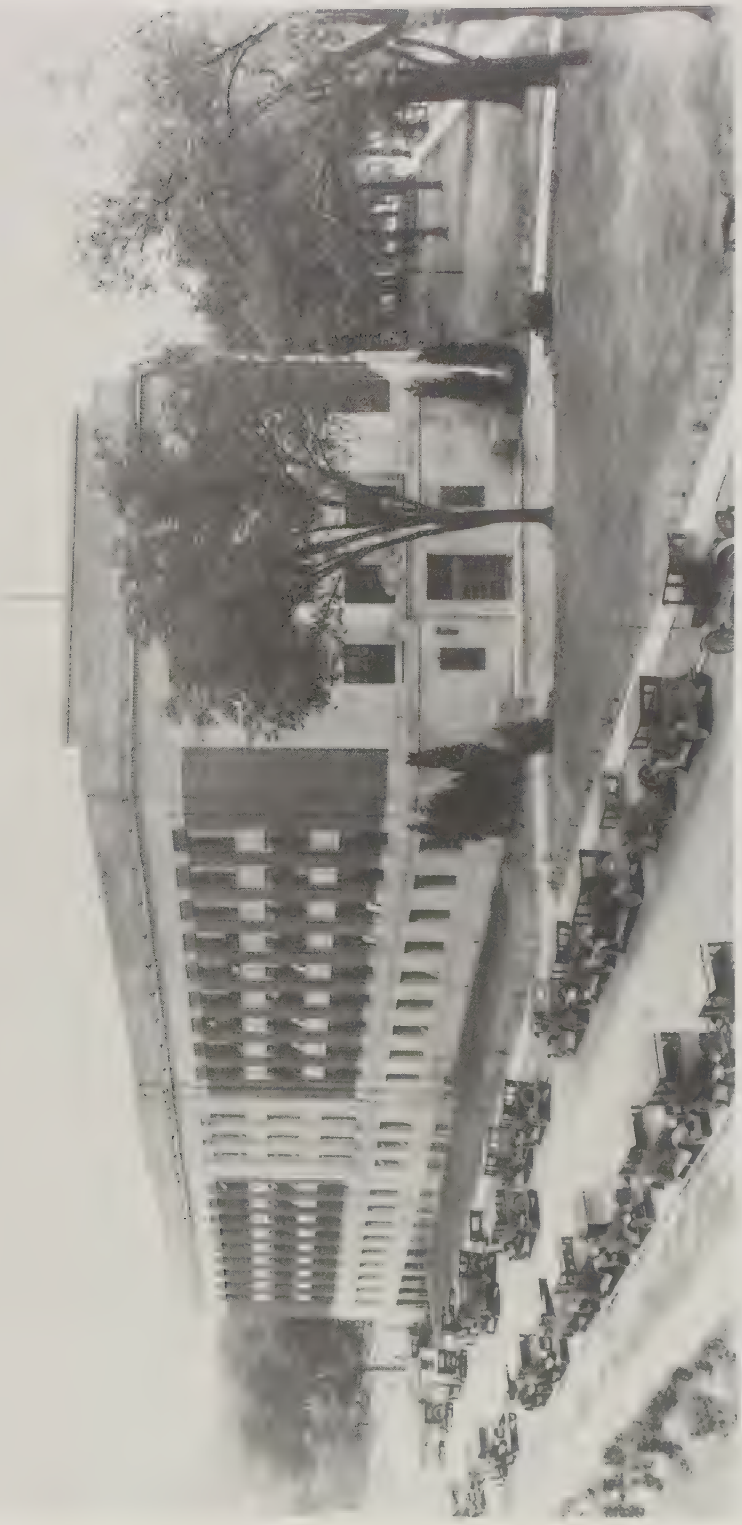

Fig. 3. Ruthven Museums building, 1928.

into studies of faunal distribution until he left for another position in 1906. While at Michigan both Reighard and Adams had graduate students who were to become prominent figures in the museum and its collections.

In the first part of the twentieth century the museum expanded its collections and became an active university center for ornithological research. The curators contributed to the expanding collection with bird specimens from North America and later from elsewhere. In addition to their own collecting efforts, they also purchased specimens from field collectors. Much of the growth of the collections and expanded research can be attributed to the combined efforts of the Director of the Museum, A. G. Ruthven, who was responsible for the new museum building, and by the curatorial activities of J. Van Tyne. They were supported by interested Michigan alumni, friends and patrons of the natural sciences who enjoyed working with birds, and by forceful and effective administrators. Together they built a center of ornithological research that is nationally and internationally recognized.

Alexander G. Ruthven (1882–1971) came to Ann Arbor to work with Adams as a graduate student in 1903, and he led expeditions to the Porcupine Mountains and Isle Royale in northern Michigan in 1903 and 1904, collecting birds and other vertebrates. In 1906 he completed his dissertation on snakes, and when Adams resigned that year to direct the Cincinnati Museum, Ruthven succeeded Adams as Instructor in Zoology and Curator of the Museum.

In his first history of the museum, Ruthven (1910) noted that it was important for the mandate of the Michigan Geological Survey to carry out a biological survey of the state. As a result the state designated the Museum as the depository of collections and a central record bureau of the state surveys, so it had the function of a state museum, and Curator Ruthven was also appointed Chief Field Naturalist of the reorganized Michigan Geological and Biological Survey in 1908. The arrangement brought in thousands of specimens to the museum, and Ruthven himself led 18 museum expeditions (Kluge 1996). All this activity attracted successful professional men and volunteer assistants, some of whom remained 20 years or longer at the museum.

In 1912, Ruthven initiated several fundamental organizational changes in the museum. In a request to the University Regents, Ruthven proposed that the Museum of Natural History become the Museum of Zoology and that he become its Director. In 1913, the Regents changed the name to the Museum of Zoology, and the Department of Geology took over the geology collections. The Directorship changed from the Professor of Zoology (Reighard) to the Head Curator (Ruthven), and the museum became distinct from the departments, and on the same level as the University libraries. Ruthven used his social contacts with corporate and governmental leaders of the state to direct financial assistance to the museum. Ruthven arranged for the University Regents to create the honorary position of Associate in the Museum in 1912; the first Associates, Bryant Walker and B. H. Swales (Detroit lawyers) and C. C. Newcomb (a physician), purchased specimens and supported museum field expeditions. At the same time, the museum library was established through the generosity of Swales and Walker, and relevant books were transferred from the University general library to the museum library. Throughout the history of the museum, the University administration has provided most of the budget, although patrons supplemented funds for museum field research and collections.

Ruthven, as Director, persuaded the University Regents to increase the size of the professional and support staff of the Museum. From 1912 to 1928 the number of Curators and staff grew from 5 to 27. In 1916 the Regents recognized a Division of Birds and Mammals, and in 1919 a Division of Birds. With the growth of the staff and recognition of other new Divisions, Ruthven argued the need for a new building to bring together the collections of the old museum and other buildings (Ruthven 1931). He proposed the new building to the Regents. The state appropriated funds in 1925, and the collections moved into that new building, our current one, the Alexander G. Ruthven Museums Building, in 1928 (Fig. 3). Ruthven continued to influence the training of graduate students and the administration of the museum after he became University Dean of Administration in 1928 and University President in 1929, a position he held until 1951 (Van de Water 1977).

Norman A. Wood (1857–1943) (Fig. 4) joined the museum in 1895 as taxidermist to mount the birds of the Steere collection. These specimens were first made into flat skins by Steere, then into mounts, then later most were remade as study skins. In 1912 Wood was appointed the first Curator of Birds (Ruthven 1910, Wood 1919). Wood kept records of bird migration for 50 years, beginning in 1880 (Wood and Tinker 1934). He allowed use of the collections by amateur birdwatchers, and he kept a notice board with the arrival dates of spring migrants. The Michigan Ornithological Club met regularly at the museum, and the club used a telescope to watch night migration of birds passing over the face of the moon. Wood encouraged university students (e.g., Leopold 1924) and amateur birdwatchers; one local boy he influenced was J. Van Tyne (Walkinshaw 1957).

Wood was interested in the distribution of Michigan birds (Wood 1951). He discovered the nest and breeding grounds of Kirtland's Warbler

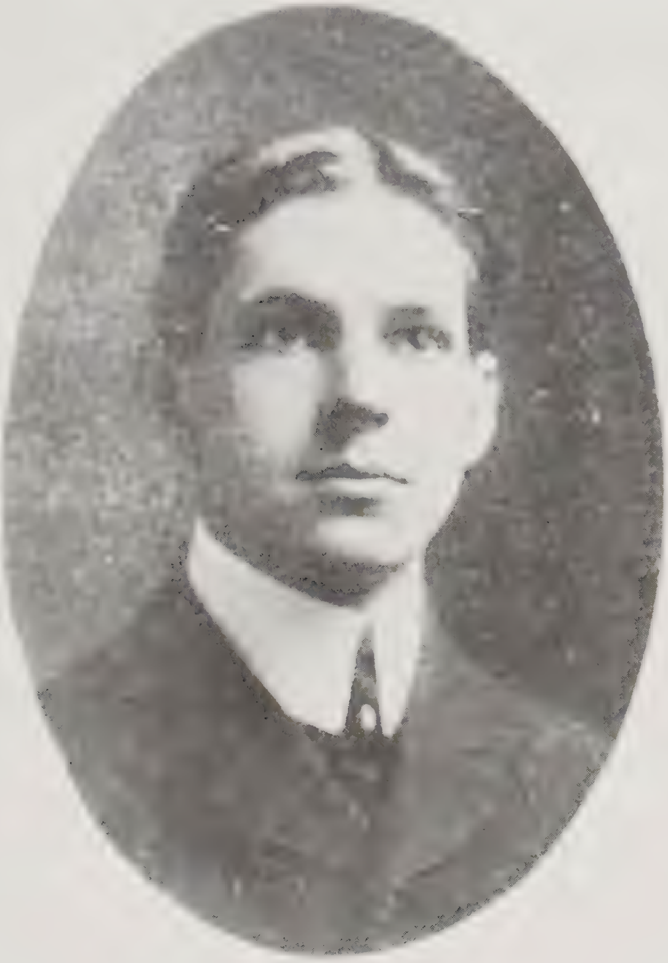

Fig. 4. Norman R. Wood, first Curator of Birds (Bull. Michigan Ornithol. Club 1903:50).

(*Dendroica kirtlandii*) (Wood 1903). He collected in Michigan over more than 30 years (Porcupine Mountains and Isle Royale in 1904, Charity Islands in 1911, Berrien County in 1920, Beaver Island and Lake Huron islands in 1922, Beaver Island in 1929, Keweenaw Point and Fish Point in 1931, and worked in north-central Michigan for many years with Kirtland's Warblers). He collected in North Dakota (1920, 1921) and in Florida with W. G. Fargo (1927). He lived in China for a year (1923–1924) and collected for the museum. Wood exchanged specimens with other museums (including many of his China birds and a few Steere Asian birds with MCZ, in return for Michigan birds), loaned and gave specimens to secondary schools, prepared specimens, catalogued them, and provided cases for storage and display. He discarded many specimens without data, particularly Michigan birds which he reasoned could be collected again. In 1928, Wood and Van Tyne moved the collection of 18,000 bird skins from the old building into new cases in the new museum building. Wood remained active after he retired in 1932.

Bradshaw H. Swales (1857–1928) was an enthusiastic amateur ornithologist, University alumnus, and patron of zoological expeditions and publications. His early life was in Detroit, where he was active in the Michigan Ornithological Club and practiced law. Swales published his first bird paper at age 14, 34 by age 21, and 101 papers altogether. He was interested in Michigan birds and completed a state bird list (Swales 1903-1904). Swales was appointed the first Associate in Ornithology in 1913 and was the most important unsalaried contributor to the Division of Birds in the first part of the century. He gave UMMZ 2004 specimens from his own collection, the first installment being 523 skins in 1913. With Bryant Walker and C. C. Newcomb he initiated and supported the museum's serial "Occasional Papers" and "Miscellaneous Publications" in 1914. He donated 1088 books and thousands of reprints on birds that became the nucleus of a research library, now known as the Swales Library. After Swales moved to Washington, D.C., in 1918 (Richmond 1928), he maintained his connection with UMMZ as Associate Curator.

Walter E. Hastings (d.1965) was Custodian of Birds' Eggs from 1922 to 1932. He was a businessman, but shifted to the museum to pursue his interest in birds. He presented the museum with his collection of 5000 eggs, most of them taken around the turn of the century by other collectors. The 1854 sets comprise nearly all the eggs in the UMMZ collection (Kiff 1979, Kiff and Hough 1985); fewer than 200 are from donors other than Hastings. When he left the museum, Hastings became a photographer for the Michigan Department of Conservation, collected birds for Van Tyne, and then started a natural history museum in northern Michigan at Interlochen Camp, later the National Music Camp and now Interlochen Center for the Arts, where his bird specimens are still used in the environmental studies program.

Josselyn Van Tyne (1902–1957) (Fig. 5), Curator of Birds from 1928 to 1957, held professorial appointments in the Department of Zoology from 1937 to 1957. He collected his first specimens as a graduate student in 1924 and during his graduate fieldwork he collected in Panama. He was the first academically trained ornithologist in the University, completing his Ph.D. at Michigan with Ruthven in 1928 (Van Tyne 1928, 1929). His interests

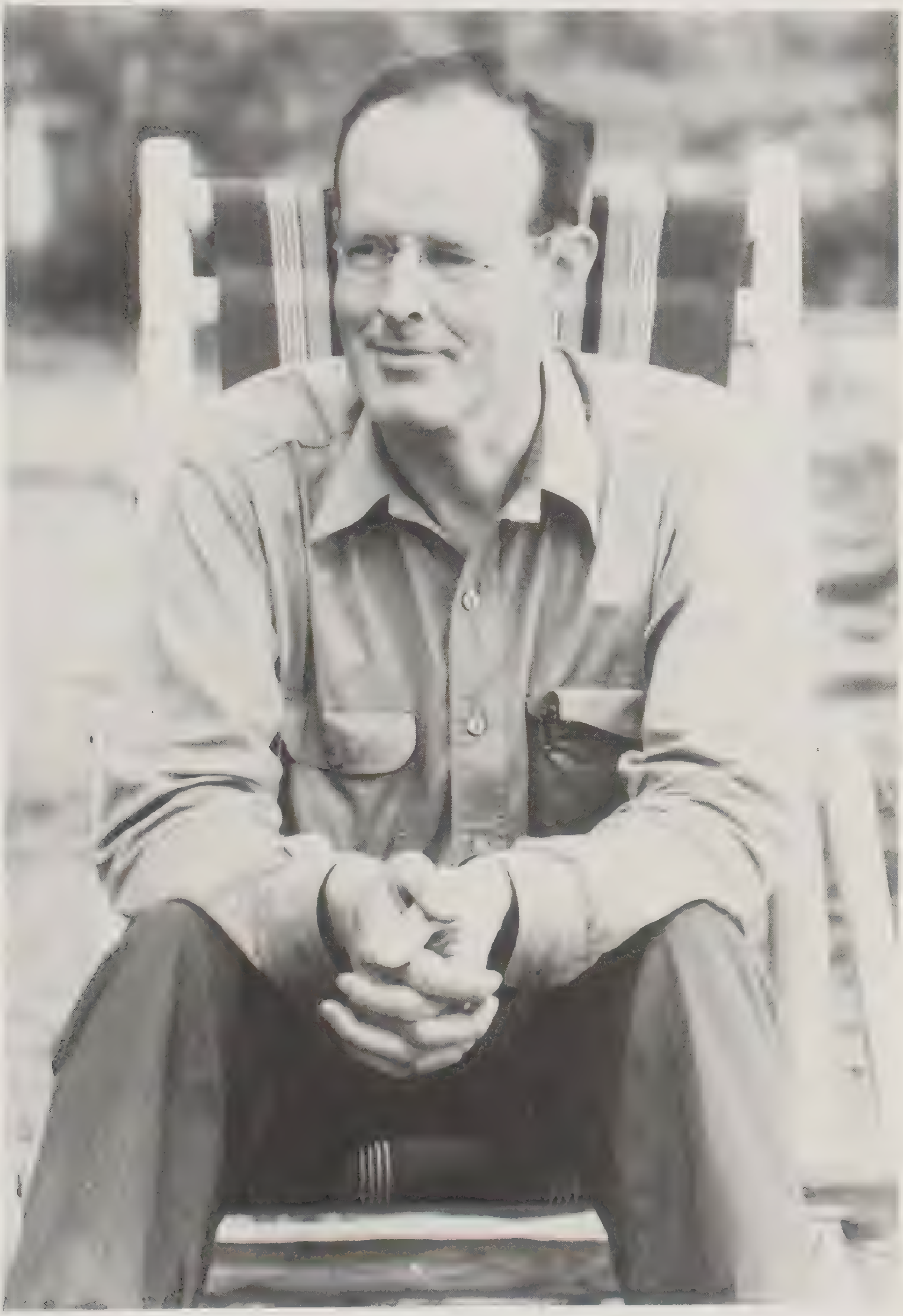

Fig. 5. Josselyn Van Tyne, at the University of Michigan Biological Station in 1939.

were broad and included avian systematics, distribution, ecology, and life histories. He wrote and edited, curated and studied the bird collections, and worked in the field. Through his efforts and direction the university collection became of worldwide importance and the Division of Birds became an international research center.

Van Tyne grew up in an Ann Arbor family that provided him with models of academic success and with important social connections (his father was Chair of the History Department at the University of Michigan, supported Ruthven when Ruthven was considered for University President in 1928, and posthumously won a Pulitzer Prize in 1930; his wife's father was Dean of the Law School). Van Tyne's own efforts, together with his family and support by his Professor and Director Ruthven, his absorbing interest in birds, his fieldwork, his prolific correspondence, his editorial efforts, and his ability in persuading local amateurs and professionals to work together and build a center for ornithology, all led to success. None of this came easily. He was meticulous and scholarly, and reserved by nature. He was obsessed with detail, a classic museum curator. Max M. Peet wrote, "The trouble with Van is that if he undertakes something, no matter how trivial it really is, it is an enormous undertaking and requires his utmost efforts." But his accomplishments were impressive (Storer 1957, 1960). Van Tyne noted in a letter to W. G. Fargo in 1957, "And what an ornithological center we have built in these thirty years?! Do you realize that we have added about 125,000 birds from all parts of the world to the collection (including an extraordinary number of species and genera)! In my opinion it is now the second best university collection in the world." Van Tyne's deference to Harvard, his undergraduate school, was unnecessary. The UMMZ Division of Birds had fewer specimens than Harvard's MCZ, but MCZ had no professionally trained ornithologist in their Bird Department until Mayr arrived as Director of the museum in 1953. The UMMZ collection was growing rapidly while MCZ activities were archival, and MCZ did not have a graduate program to train new ornithologists (Barrow 1995), whereas the graduate training that Van Tyne began at the University of Michigan has been at least as significant as the collection.

Van Tyne took with him into the field Michigan business people and naturalists who had an interest in birds. This led to friendships and funds that supported fieldwork, contacts with bird banders, naturalists who sent their bird observations to the museum, and students and other people who assisted in the collections and in editorial work. Van Tyne encouraged the sons of Ann Arbor business families to do something useful during the economic depression of the early 1930s: Almerin D. Tinker (of Tinker's Tailor shop), Richard E. Morrill (of Morrill's Office Supply), and Thomas D. Hinshaw (of Hinshaw's Music shop; the source of the round tins that now hold fumigant in the collections were tins for violin strings) worked as volunteers in the Division of Birds to help with routine matters in editing publications, printing labels, cataloguing, and indexing collections, and they joined in as field collectors on Museum expeditions. Van Tyne also encouraged the many bird observers who flocked to the museum (Van Tyne 1938, Mayfield 1957).

Van Tyne conducted an active program of fieldwork when not tending to responsibilities at the museum, especially while he was young and in good health. He collected for ten months in 1928-1929 with the Kelly-Roosevelt Field Museum Expedition to Indo-China (Van Tyne 1933a). In the following years he organized museum expeditions to south Texas (1928, 1930, 1932) (Van Tyne 1933b, 1936, Van Tyne and Sutton 1937), to Yucatan in 1931, 1936 and 1937 (Van Tyne and Trautman 1941), to Guatemala and British Honduras in 1931 (Van Tyne 1932, 1935), to the Bahamas to look for wintering Kirtland's Warblers with Harold Mayfield in 1949 (Van Tyne and Mayfield 1952), and to the Canadian arctic in 1954 (Van Tyne and Drury 1959). He also continued fieldwork in Michigan: in the Huron Mountains, in Saginaw Bay, on the islands of Lake Michigan, and for many years in the jack-pine plains of Kirtland's Warblers with Harold Mayfield.

As Curator, Van Tyne corresponded with bird collectors in North and South America, instructed them on techniques for preparing bird skins and labels (Van Tyne 1952), and advised them to sell their specimens to the museum as their due for this instruction. He was quick to exchange with other museums for species missing from the collection, and to rescue orphaned collections and buy them when they became available. However, his hubris ruffled some feathers. In one case, Indiana high-school student Frederick H. Test wrote Van Tyne to ask about fieldwork in Honduras in 1933, and Van Tyne later identified birds that Test collected there and sent on loan. Van Tyne returned most of them but kept two quail not represented in the collection—without Test's consent. Nevertheless, Test later donated his family collection of 1014 birds, mainly from Indiana (Test and Test 1931-1934), Colorado, and California, to UMMZ after he retired as Professor of Zoology from the University of Michigan in 1978.

With Ruthven's encouragement, Van Tyne invited the Wilson Ornithological Club (now Wilson Ornithological Society) to hold its annual meeting in 1928 in Ann Arbor, the year when the collections were moved into the new museum building. In the same year an editorial in *The Wilson Bulletin* suggested that the Club establish an ornithological library and locate it in a midwestern university. In 1930 the Club officers agreed to establish a library, keep it in the Museum of Zoology, and vest owner-ship of the library in the University of Michigan. In 1931, the first year of its existence, gifts to the library totaled 54 bound books and 750 reprints and separates (unbound issues); the present holdings of the library include 2900 books, 5420 bound journal volumes, about 63,000 reprints, 550 translations, and 80 bird song records and tapes. The museum gained not only the books that were donated by members and purchased through their bequests, but also the journals that were exchanged for *The Wilson Bulletin*. At present more than 200 ornithological journals are received yearly in this exchange, and the Wilson Ornithological Society Library is known as the Van Tyne Memorial Library. The two libraries (Swales, Van Tyne) remain in the Museum in the Division of Birds. The Wilson Ornithological Society (WOS) and the University both continue to purchase books and make them available to WOS members. Van Tyne was an officer in the WOS from 1932 to 1937, and was Editor of *The Wilson Bulletin* from 1939 to 1948 when it came to command respect as a scientific journal. He maintained a prolific correspondence with other ornithologists, edited monographs, and exchanged publications to build up a series of reprints and books on birds of the world.

In the museum Van Tyne was a voice of authority in keeping with his editorial style. When Laurie Binford was an undergraduate student in the Bird Division in the 1950s he was mentored mainly by graduate student Phil Humphrey, and although Binford had an office next to Van Tyne's for his first few months, he did not see Van Tyne, and only later learned that he was there all the time working behind a closed door, arriving early and leaving late. Because the Rule was that all museum publications on birds must be approved and edited by Van Tyne, when Binford wrote his own first note on birds he knocked, opened the door, and looked up to meet the man whose approval he sought. The first words to him were, "Young man, I am five-foot, nineteen." Binford was invited to join Van Tyne and Mayfield in 1956 on what turned out to be Van Tyne's last field trip to the Kirtland's Warbler country in the jack-pine plains of northern Michigan, near Mack Lake. On the trip, shortly after Van Tyne had gone collecting, Mayfield and Binford heard a loud explosion. A few seconds later Van Tyne appeared, his huge hand carrying a Brown Creeper (*Certhia familiaris*) by the feet. Van Tyne explained, "It attacked me."

After his death in 1957, Van Tyne's long-term work was completed by others: Dale Zimmerman wrote the revised check-list of Michigan birds (Zimmerman and Van Tyne 1959), Harold Mayfield (1960) wrote the Kirtland's Warbler book, and Andrew J. Berger completed the *Fundamentals of Ornithology* (Van Tyne and Berger 1959). Van Tyne's background for "the book" (as Berger called it in his preface) came from his experience as editor and teaching his graduate course in ornithology, but the manuscript was less than half completed at the time of his death. It had chapters on biology and anatomy of birds, a useful glossary, and a systematic summary of the bird families of the world written by Van Tyne and each family illustrated with a bird by George M. Sutton. Mayr (1959) noted in his review, "Van Tyne was always a severe critic and of nothing more critical than of his own efforts." In Mayr's view, the book had many facts but was not theoretical, it was scholarly but descriptive, it was objective but not controversial, it was particularly good on breeding behavior, and it had a strong emphasis on the systematic accounts, but each family had one page no matter how many genera and species, and "worst of all" some finch groups were lumped (carduelines) or were "not even mentioned" (estrildids) (they were, but not in the family account). At least it had a good bibliography and index! In perspective, *Fundamentals of Ornithology* was indeed "the book" for a generation of ornithologists and it defined the field. Berger saw it through a second edition (Van Tyne and Berger 1976).

William G. Fargo (1867–1957) was a civil engineer and a pioneer in the design of hydroelectric plants. His interest in natural history as a boy in Michigan led him into the museum about the time he sold his interest in Consumers' Power Company and retired, unmarried. He developed a friendship with J. Van Tyne, and in 1928 when Van Tyne became a Curator, Fargo was appointed Honorary Curator of Birds. In fieldwork near his home at Jackson, Michigan, he described and photographed the two nest types of "Traill's Flycatchers" (Fargo 1928); the two nests later proved to distinguish the two species Willow Flycatchers (*Empidonax traillii*) and Alder Flycatchers (*E. alnorum*) (Stein 1958, Payne 1983). A practical engineer, Fargo designed an auxiliary barrel to use a .410 ga shell in a larger shotgun (F[argo] 1927); the design is still in use. In 1926 Fargo first gave the museum specimens he collected in Michigan and Florida. He financed the fieldwork of the curators and graduate students and provided funds for Van Tyne to purchase birds for over 30 years.

Fargo's role was recognized by Van Tyne after Fargo suffered a fall at the age of 89. Van Tyne (in a letter of 17 January 1957): "What a fine, long friendship we have had! It must be 32 years ago that Dick [Gaige] introduced us over in the old museum building. I wish we might have had more field trips together, but I shall never forget the wonderful trip we had to Agawa Bay in 1926 when you just about walked the legs off me on some of our hikes. And what an ornithological center we have built! . . .You have always kept yourself carefully in the background, but a great amount of the credit for this rightly belongs to you, not only because of your steady support of our many projects but because of your encouragement." Van Tyne died three weeks after Fargo.

Max Minor Peet (1885–1949), a friend of the museum, native of Michigan and neurosurgeon, was Professor of Surgery at the University of Michigan from 1916 to 1949. His professional life was described by E. Kahn (1972), Peet's first resident in neurosurgery. W. B. Hinsdale, Dean of the Homeopathic Medical Department, offered a prize at the Bird Club in Ann Arbor for the best paper on local birds. In 1906 Peet won the prize, and his paper, an early account of bird ecology, was published by the Michigan Academy of Sciences (Peet 1908a). Peet was a good companion and a crack shot, accompanying museum expeditions in Michigan on Isle Royale in 1905 with C. C. Adams and N. A. Wood (Peet 1908b,c), in 1907 in Iowa with Ruthven, in 1932 in the Chisos Mountains of Texas with Van Tyne, and on his own medical trips through North America. He also bought and exchanged bird specimens with other collectors. His correspondence on birds is in the museum. While in the museum he counseled graduate students and discussed birds with Van Tyne.

Famous for speed and accuracy in brain surgery, Peet attributed his skill to skinning baby hummingbirds (Kahn 1972). He made up many study skins of birds, a task he "found welcome relaxation after long hours of surgery," and worked with his collection at the museum in the mornings.

Peet built up one of the finest private collections of North American birds (Van Tyne 1951). In 1950, after Peet died, his family presented the museum with his collection of 32,300 bird specimens, including 3815 birds taken by Peet himself.

Peet and Van Tyne purchased specimens from the same collectors. One of them, H. H. Kimball (1878-1945), merits an historical note; Van Tyne first purchased from Kimball in 1930, while Peet purchased from him from 1913. Fargo met Kimball in Texas in 1930 and wrote to Van Tyne: "Kimball is well informed and has a vast store of knowledge of birds in his head and a fine memory. He represents the type of old time collectors who have lived out of doors all their lives and make light of camp duties while busy collecting. They are at home where they make camp . . . It is regular routine to go out in the morning and shoot 20 to 30 small and medium sized land birds and make the lot into first class skins wrapped in sheet cotton, properly labeled and put in the drying rack before late afternoon."

On a field trip in California when Kimball was in his teens, he met Loye E. Miller, who showed him how to skin birds and label them. In the 1890s Kimball worked in Arizona, then collected for dealers of natural history specimens. He also collected in the lower Rio Grande of Texas and in Arizona, New Mexico, California, and Mexico. Peet purchased skins from him through the 1930s and early 1940s. Peet's last letter to Kimball arrived shortly after Kimball's death; it passed to Kimball's sister. An exchange of letters with her led to Peet's purchase of 15,146 additional Kimball birds. Many had only date and sex on their labels (e.g., Storer 1961), but from correspondence and matching the dates and places with Kimball specimens in FMNH, much of Kimball's itinerary has been determined.

Pierce Brodkorb (1908–1992), a graduate student under Van Tyne, remained in Ann Arbor as Assistant Curator of Birds under Van Tyne from 1936 to 1946 (except for a period of military service). Brodkorb's main contribution to the museum was his collection of specimens. He collected birds in Michigan, in the northwestern states from South Dakota to Idaho in 1934, and in southern Mexico, especially Chiapas, in 1937, 1939, and 1941. He had a book manuscript on the birds of Chiapas nearly completed in 1960, although it was not published. He published accounts from his fieldwork and collections, with a regional overview (Brodkorb 1943), several papers on flycatchers, and part of his dissertation on *Empidonax* flycatchers (Brodkorb 1949). He also wrote distributional accounts and described new taxa of Steere birds (Brodkorb 1934, 1937). Brodkorb published eight papers on Alberto Schulze's Paraguay birds and proposed to write a book with him on the birds of Paraguay. Schulze demanded money, in addition to the typewriter from Morrill's Office Supply that was sent to Paraguay at a time when business with nationals of belligerent countries was prohibited, before he would send his field notes. If the field notes existed, they never were seen in Michigan, and the book was never written.

Brodkorb's field correspondence with Van Tyne in the 1930s showed a subordinate dependence on Van Tyne. Van Tyne directed what birds Brodkorb was to collect and Van Tyne controlled access to funds for Brodkorb's fieldwork (supported by Fargo, but always through Van Tyne). Storrs Olson (1993), who later worked with Brodkorb, has written about the acrimonious flavor of the relationship with Van Tyne. Van Tyne appears to have rubbed other curators at Michigan in much the same way, domineering and overbearing, when the young men who worked under him began to establish their own identity as ornithologists. Institutional memory has it that Brodkorb and Van Tyne communicated by way of notes to the Museum Executive Committee, but the details are no longer available, because in later years Bob Storer destroyed all the museum intramural correspondence involving Van Tyne that might be taken as negative, and none remains. In 1946 Brodkorb moved from Ann Arbor to join the faculty of the Department of Zoology at the University of Florida, where he assembled a comprehensive collection of bird skeletons and became an authority on avian paleontology through his identifications, descriptions, and his catalogue of fossil birds (Brodkorb 1963-1978, Campbell 1992, Olson 1993).

George Miksch Sutton (1898–1982), a naturalist and artist who painted birds from life, had a broad audience with amateur naturalists because of his charismatic personality and populist style of writing. He painted watercolors and observed the natural history of birds in the arctic, in Michigan, in the southwest, and Mexico. While curator of birds at Cornell (1932-1943) and later through 1948, he spent several summers in Michigan at the Edwin S. George Reserve, a field research area of the University of Michigan near Ann Arbor. There he studied the natural history of vireos, buntings, and sparrows (Sutton 1935, 1941, 1943a, 1949, 1959-1960). In 1934 and again in 1935, Van Tyne invited Sutton to be Assistant Curator of Birds at UMMZ and then Curator of the George Reserve. Sutton stayed at Cornell, but he stored his paintings at UMMZ during his wartime years in the armed services (Sutton 1943b). In 1947 he came to Ann Arbor as half-time Curator of Birds and Consultant in Research, working in the museum, skinning birds, painting, writing and advising graduate students. His bird skins are the work of a perfectionist, with every feather in place. He encouraged Robert S. Butsch, William A. Lunk, David F. Parmelee, Robert M. Mengel, and Dale A. Zimmerman as students and bird artists. He enjoyed the fieldwork at the George Reserve, but not the developing problems of personality with Van Tyne, when this former friend became a difficult colleague. One hill cannot shelter two tigers. When Sutton skinned birds on hot summer days in the museum without wearing a shirt, Van Tyne wrote spiteful notes to the Museum Director. Shortly after he taught at the University of Oklahoma Biological Station in 1951, Sutton left Ann Arbor with his bird collections and students and joined the University of Oklahoma faculty at Norman in 1952. His specimens remaining in UMMZ are mainly from the George Reserve; the others he maintained as a personal collection which he used in painting, research, and coaxing deans for additional support. Sutton eventually sent his personal collection of 7700 birds to the Delaware Museum of Natural History.

Walter N. Koelz (1895–1989), naturalist and traveler (Fig. 6), was born in 1895 at Waterloo near Ann Arbor. He was a graduate assistant under Reighard in the first field course in ecology at the University. He began his lifetime interest in collecting birds in his hometown of Waterloo (Koelz 1923) and his earliest specimen in the UMMZ collection was taken in Ann Arbor in 1915 when Koelz was a student at the University of Michigan. His Ph.D. in 1920 under Reighard was on systematics of whitefishes of the

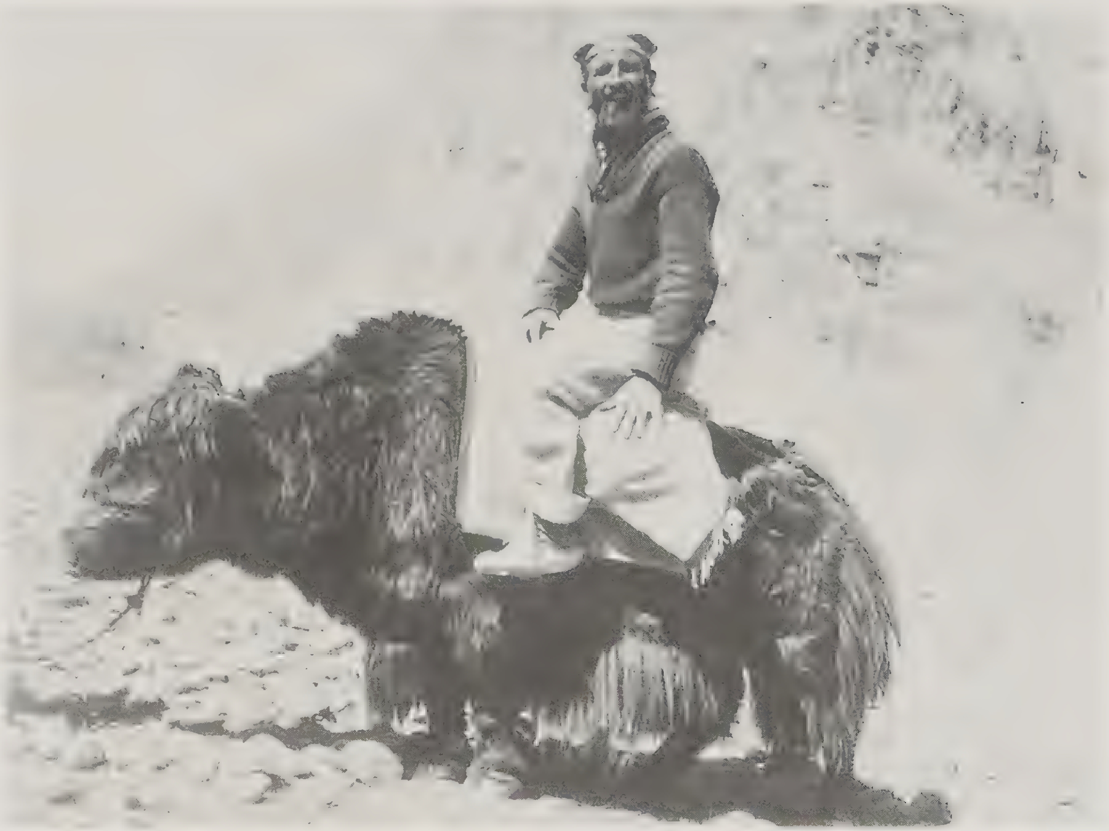

Fig. 6. Walter Koelz in Ladakh. Koelz traveled and lived in the local style. He wrote to Van Tyne, "If I go anywhere it's barefooted, on foot and in sackcloth and ashes. Of course horses can be had and if you want to take enough you can carry food, but the suffering of dealing with the requisite no. of horsemen has reduced me to saintly simplicity and you would take me for some Middle Ages saint, should you meet me en route."

Great Lakes. Koelz was an unsalaried museum Research Investigator for many years. He was temporarily appointed Curator of Fishes, but the position had been created for Carl L. Hubbs. After Hubbs arrived on campus in 1920, Koelz had appointments with the U.S. Bureau of Fisheries and the state Institute for Fisheries Research. He was Naturalist with the U.S. Navy-National Geographic Society MacMillan Arctic Expedition of 1925 (MacMillan 1925a,b) and from his collection he described the Gyrfalcons (*Falco rusticolus*) of Greenland (Koelz 1929). The museum purchased his 3350 arctic bird specimens in 1929. Although Koelz gave a few birds to the museum, more often he sold and exchanged birds from his own collection.

His early work with birds in northern India was in Ladakh, where the people identify themselves as Tibetans and the region as Little Tibet (Koelz 1935). In Himalayan terrain, Koelz wrote to Van Tyne, "I am still a little puzzled as to a fly's method of walking on the ceiling but I confidently expect to do it in a few days." His first trip from 1930 to 1932 was to study ethnobotany and medicinal plants (Koelz 1979). Koelz next was appointed a Research Fellow of the University of Michigan; in 1932 he went to India to collect Tibetan plants, animals, and cultural materials, and in 1933 he returned with artworks taken from Buddhist monasteries; the works are now in the University's Museum of Anthropology and the Museum of Art (Copeland 1980). In 1934 he worked in Michigan on a government parks project and helped acquire land for the Waterloo Recreation Area (Copeland, in Koelz 1983). He left Michigan in late 1935 to collect birds in Texas, and in March 1936 went to India and Afghanistan as a plant explorer for the U.S. Department of Agriculture. He returned in early 1938 to Michigan. From December 1938 to April 1939 he collected for Peet and Van Tyne in Georgia, then went to southern Asia where from 1939 to 1941 he traveled in Afghanistan and Persia as plant explorer (Koelz 1957, 1983), again collecting birds. In 1946 he moved to India where he collected more birds in northern India (including areas now in Pakistan), Nepal, and eastern India in Assam (including the Lushai and Garo Hills and Manipur) and Bangladesh. From 1931 through 1953 Koelz traveled with his companion from Ladakh, Thakur Rup Chand, in Asia and North America (Trow 1957, Koelz 1983). The field team put up as many as 100 specimens in a day and collected more than 60,000 birds—well more than the 40,000 attributed elsewhere (Ali and Ripley 1968, Mearns and Mearns 1998).

Koelz's efforts in the field rank him as one of the most productive bird collectors in the history of ornithology. Although A. O. Hume accumulated about 83,000 bird specimens in India and Burma, and most remaining specimens from the Hume Collection are now in BMNH, he collected fewer than half of these himself on his own expeditions; he employed more than 50 bird collectors and he bought the collections of others (Sharpe 1885, 1906, Mearns and Mearns 1998). William H. Phelps and his family obtained 76,000 birds in Venezuela and the Caribbean (Mearns and Mearns 1998) though they also obtained birds from other collectors. Koelz's determination, stamina and longevity all contributed to his success as a collector.

Koelz returned to the United States in 1953, lived for two years in New York to work at AMNH where he deposited some specimens and considered selling his others (Koelz 1950, 1951a), then brought his remaining collections to Michigan when Van Tyne convinced the Dean and the University Vice President for Research that Koelz was not a political radical (this was during a period of political persecution of the left on the University campus) and the University provided funds for the museum to purchase the specimens from Koelz. In 1955 Koelz and Rup Chand moved back to Waterloo, and Koelz lived in the house where he was born and grew up until he died in 1989. I first met Koelz there with Professor Elzada Clover and the undergraduate students' Botany Club in 1959. Koelz kept his house warm with a wood-burning stove and a series of black Labrador dogs named Toby, and kept his yard a subsistence garden that he mulched with *The Wall Street Journal* and a botanical garden with plants he had brought from Asia. He held court there through the 1980s for visiting deans, museum directors and curators, and other sages.

Koelz's relationship with UMMZ centered around Van Tyne, who looked after his mail, secured funds to buy his birds, stored his specimens, and wrote and edited his early publications (Van Tyne and Koelz 1936, Koelz 1937, 1939a,b,c, 1940). In 1955, Van Tyne arranged for purchase of 25,000 bird specimens, including 15,000 from Assam and Manipur where Koelz collected after 1950. The birds that Koelz had kept in his house were given to the museum by the beneficiary of his estate, The Nature Conservancy, along with more than 1000 of Koelz's bird specimens that Peet and the curators had kept in the museum for him with the few Koelz holotypes that were not included in Storer's (1988) list. The birds Koelz had in his house, including a series of shortwings *Brachypterus*, were badly damaged by insects when received by the museum. Koelz birds are well labeled with sex and date, and no locality discrepancies are apparent. Koelz remained home by day and worked on his collections when he appeared in Ann Arbor in the museum at night, when he and Van Tyne became absorbed looking at the specimens, and laughed and joked together (L. C. Binford, in litt.). Upon his last visit to the museum in 1957, a few months after Van Tyne died, Koelz annotated a series of 1:50,000 maps in the Division of Birds with his collecting localities. No specimen register or field diary is known (his diaries of 1932 and 1933 were lost (Copeland 1980); other notebooks were left in India in 1953). However, from 1935 through 1948, Rup Chand kept a field diary which he translated into English when he worked in the 1970s and 1980s at the University Herbarium. The manuscript is now in the Herbarium and includes some comments on the birds collected.

Koelz described one new bird species and many subspecies from India, including 122 taxa in one paper (Koelz 1954). Most of his holotypes are in UMMZ; others are in FMNH and AMNH (Storer 1988). Koelz published little beyond his Persian Diary and his descriptions of new taxa, few of which are now recognized (Ripley 1961, Storer 1988) because his descriptions and diagnoses were based on differences in plumage color that are not apparent to other workers, and his sites were no longer terra incognita as other collectors were there before him (e.g., Henderson and Hume 1873, Ali and Ripley 1968). Nevertheless, the Koelz collection includes previously unknown plumages, and it has larger series for several species (honeyguides, babblers) than all previous collections of Indian birds combined. The Assam collection is by far the largest anywhere and it is the primary record of birdlife in this region. Altogether, Koelz collected 30,273 birds in southern Asia, as well as birds from Greenland, Michigan, New Mexico, Texas, Virginia, and Georgia, for a total of 32,723 Koelz specimens that came to UMMZ. About 3% of these were later exchanged with other museums. Other major collections of Koelz birds are in FMNH (19,300 skins) and AMNH (8600 skins), and some specimens are in Calcutta in the collections of the Zoological Society of India (Koelz 1951b, 1952a,b).

RECENT HISTORY AND CURRENT STATUS OF ORNITHOLOGY

In the years after WW II, the museum ornithologists at UMMZ have been more active in teaching. University support for the museum space, collections, and research activities has continued, but in recent years this support through the University's College of Literature, Science, and the Arts (LSA) has become conditional on increased teaching activity. At the same time, the productive level of research in the museum has led to stronger support from funding agencies outside the University, especially from the National Science Foundation (NSF), which has provided funds for the building addition, curatorial grants for the bird collections, and grants for scientific research on behavior and evolutionary biology of birds for all the curators hired after WW II.

In 1945, the College of LSA assumed administrative control of the museum, and this control led to increased time in the classroom for the curators. After the students returned to campus following the war, the museum faculty began to teach. Bird courses were offered by Van Tyne as were courses on other taxa by other curators, beginning in 1949. The curators taught undergraduates beginning in 1954, when three assisted in a Zoology Department "experiment." At first, this classroom teaching was unpopular with the curators as it took time from their care of the collections and their research. Beginning in 1956, new curators have been hired with appointments shared between the museum and academic Department (now the Department of Biology), and the older curators also began to teach undergraduate classes. Van Tyne disapproved of these joint appointments but told the first person so appointed, Curator of Insects Tom Moore, not to take his disapproval personally. Classes on birds and other taxonomic groups were marginalized from 1978, when they could no longer be used by undergraduate students to fulfill a requirement for the Departmental academic concentration, and the museum faculty were directed to teach large classes. The bird curators during the period after J. Van Tyne were R. W. Storer, H. B. Tordoff, R. B. Payne, M. C. McKitrick, and D. P. Mindell. Other university faculty in the area of avian biology at the University of Michigan from 1950 who did not hold curatorships in the Division include Harry W. Hann, Frederick H. Test, Francis C. Evans, Andrew J. Berger, William R. Dawson, John A. Kadlec, Peter R. Grant, and Terry L. Root.

In recent years, the bird curators have been more involved in research and academics and less involved in the amateur tradition of ornithology, while at the same time amateurs have been less attracted to the academic side of the field. Janet Hinshaw (Fig. 7), who has been with the Division of Birds since 1974 as technician and more recently as Coordinator of Collections, manages the collection and libraries, and is most active in supporting the amateur community through the Wilson Ornithological Society. The permanent mailing address of the Society is: c/o The Museum of Zoology, The University of Michigan, Ann Arbor, Michigan 48109. Volunteers have been helpful in preparing specimens and have included local and overseas students, travelers who want to learn about birds, retired professional people, and others who enjoy working in the museum.

Robert W. Storer (1914–), after training and working as a chemist, completed his graduate work with Alden H. Miller in the MVZ at the University of California (Berkeley). He joined the University of Michigan as Assistant Curator in the Museum and Instructor in the Department of

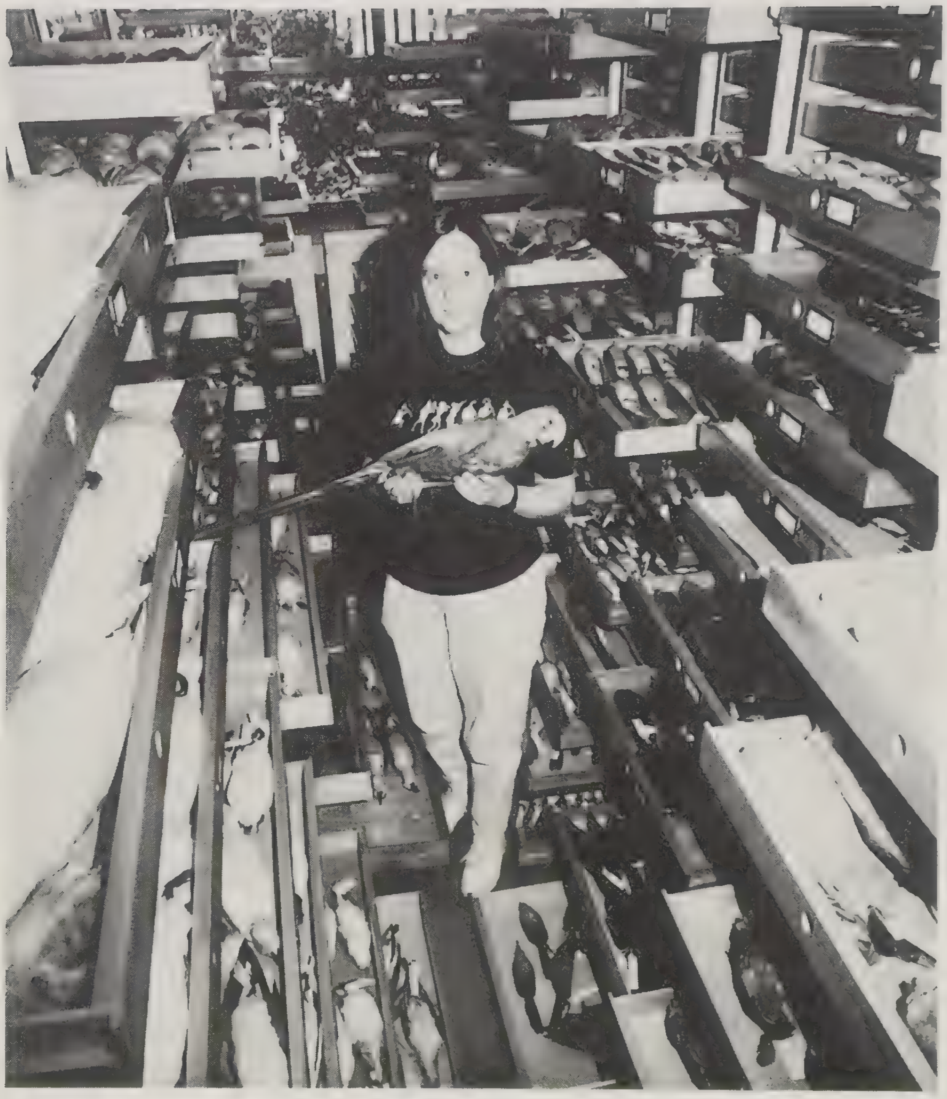

Fig. 7. Janet Hinshaw, Coordinator of Collections, and the bird collections. Courtesy of Steve Hinshaw.

Zoology in 1949 and retired as Curator of Birds and Professor in 1985. He taught a course in birds of the world and, with other curators, continued Test's course in vertebrate natural history. He built up the avian skeleton collection from 6759 specimens in 1957 to about 24,000 specimens, which are used in systematic ornithology and identification of fossil birds. Storer catalogued the Peet collection from 1950 through 1957 when Van Tyne died, after which the cataloguing of birds was completed by graduate assistants. That the UMMZ collection is the most accurately identified, maintained and accessible major scientific ornithological collection in the world (as witnessed by many of our visitors) is largely due to Storer as a "Curators' Curator" who practiced high standards as a model for the profession.

Storer has been President of the American Ornithologists' Union (AOU), a member of their Check-list Committee since 1963, and their editor (*Auk* 1953-1957, *Ornithological Monographs* 1960-1967). He has worked on the comparative anatomy of diving birds (Storer 1945, 1971a), fossil birds and anthropological materials (Storer 1976a, 1989, 1992a), and avian systematics (Storer 1971b, 1978, 1979, 1982). His major long-term field research was with comparative behavior and relationships of grebes (Storer 1963, 1965, 1976b, 1992b, Storer and Nuechterlein 1992), in fieldwork in the northern Great Plains and Prairie Provinces of Canada, in Texas, Mexico, Argentina, Peru, Chile, Madagascar, New Zealand, and Australia. He accompanied graduate students and other young biologists in their fieldwork, including Frank B. Gill in Argentina, the Indian Ocean and Madagascar (Fig. 8), Douglas E. Gill and Alan Feduccia in the prairie pothole region of Canada, Philip Myers in Paraguay, and Steve M. Goodman in Egypt. Storer was notably successful in training graduate students who went on to professional positions in other museums and academic institutions (Figs. 9, 10). Two of these students have books that are candidates for "the book" in ornithology and early avian evolution for the present generation of students (Feduccia 1980, 1996, Gill 1989, 1994).

Harrison B. Tordoff (1923–) studied with Sutton as an undergraduate at Cornell, then came to Ann Arbor for graduate studies on the skeletal anatomy and systematics of finches. He took a position at the University of Kansas Museum of Natural History in 1950 before completing his graduate degree in Ann Arbor with Van Tyne the next year. He returned to Ann Arbor in 1957 to take a curatorial and teaching position. As Curator of Birds he made superb bird skins. He taught a popular course in ornithology with an emphasis on Michigan birds. When collecting birds for his class to skin, he realized a conflict between teaching and research—he and Norm Ford inadvertently shot some banded blackbirds of another graduate student. Tordoff's research focused on the cardueline finches notably the crossbills (*Loxia curvirostra*), both field studies and captive breeding in the museum aviaries which he designed for this purpose (Tordoff 1952, 1954a,b, Tordoff and Dawson 1965). He did fieldwork in Michigan, was active with bird clubs, attracted graduate and undergraduate students, and edited the Michigan Audubon Society's journal, the *Jack-Pine Warbler*, helping students to publish natural history articles and bringing their enthusiasm into

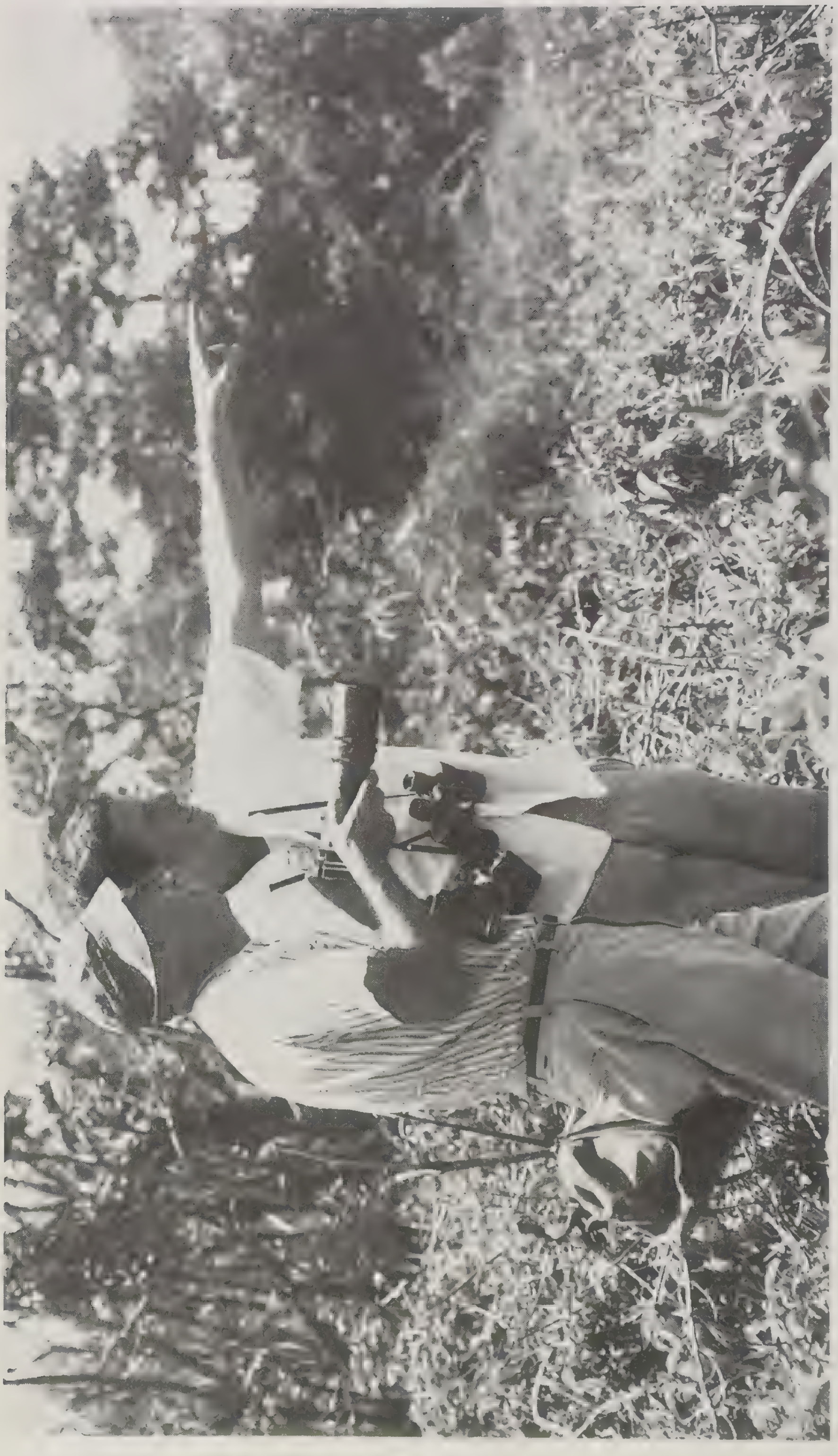

Fig. 8. The student instructs the professor: Frank Gill points out a heron to Bob Storer, Tananarive, Madagascar, December 1965. Courtesy of F. B. Gill.

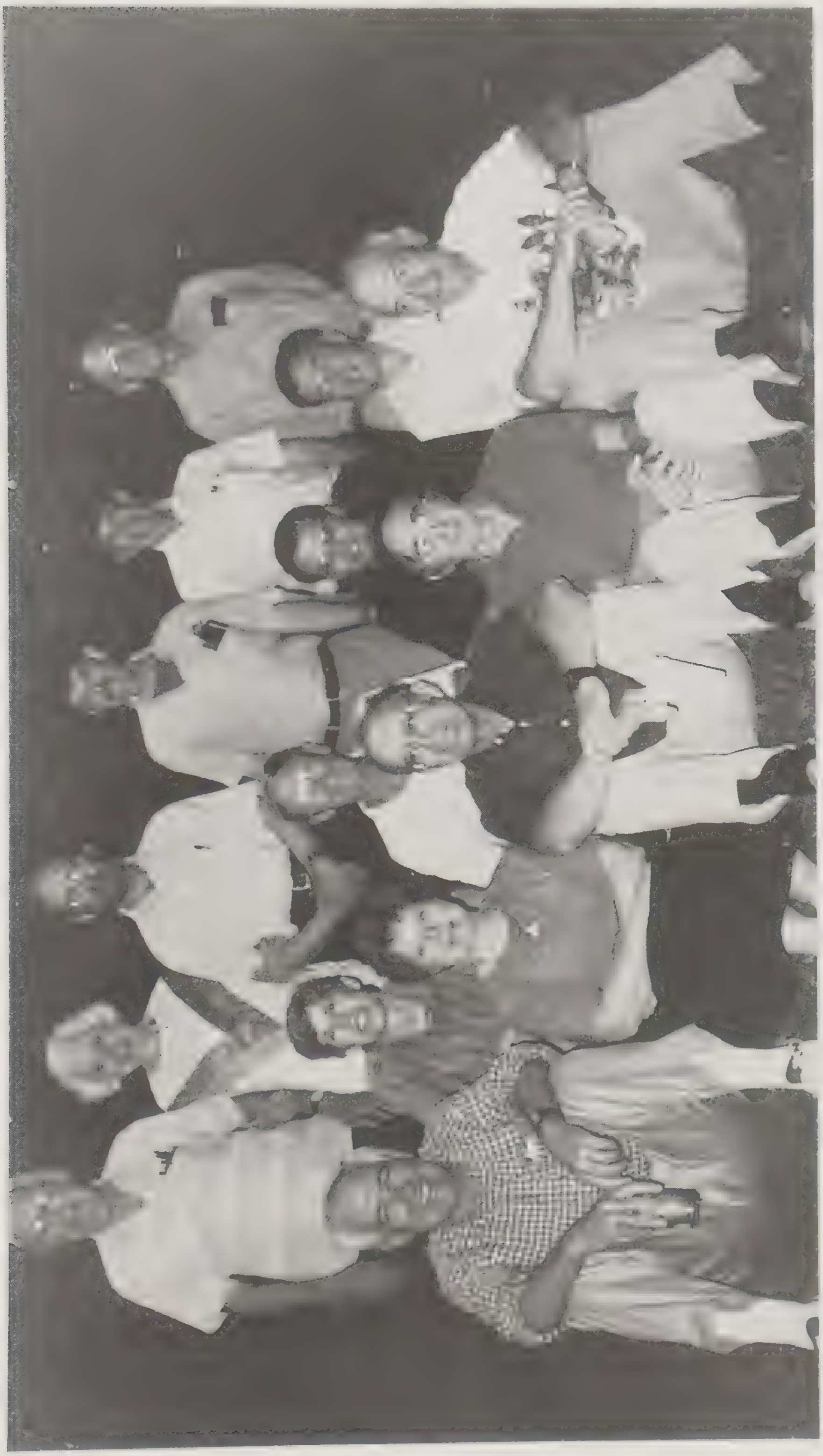

Fig. 9. Curators, former graduate students, and others at Storer's house, 2 July 1991, left to right: back row: R. W. Storer, Louise S. Storer, David Hussell, Doug Gill, Frank Gill, Bob Payne; middle row: Erica Dunn, Norm Ford, Steve Emlen, Dave Ligon; front row: Joe Jehl, Catherine E. Ludwig, Jim Ludwig, Bert Murray, H. B. Tordoff. Courtesy of N. R. Ford.

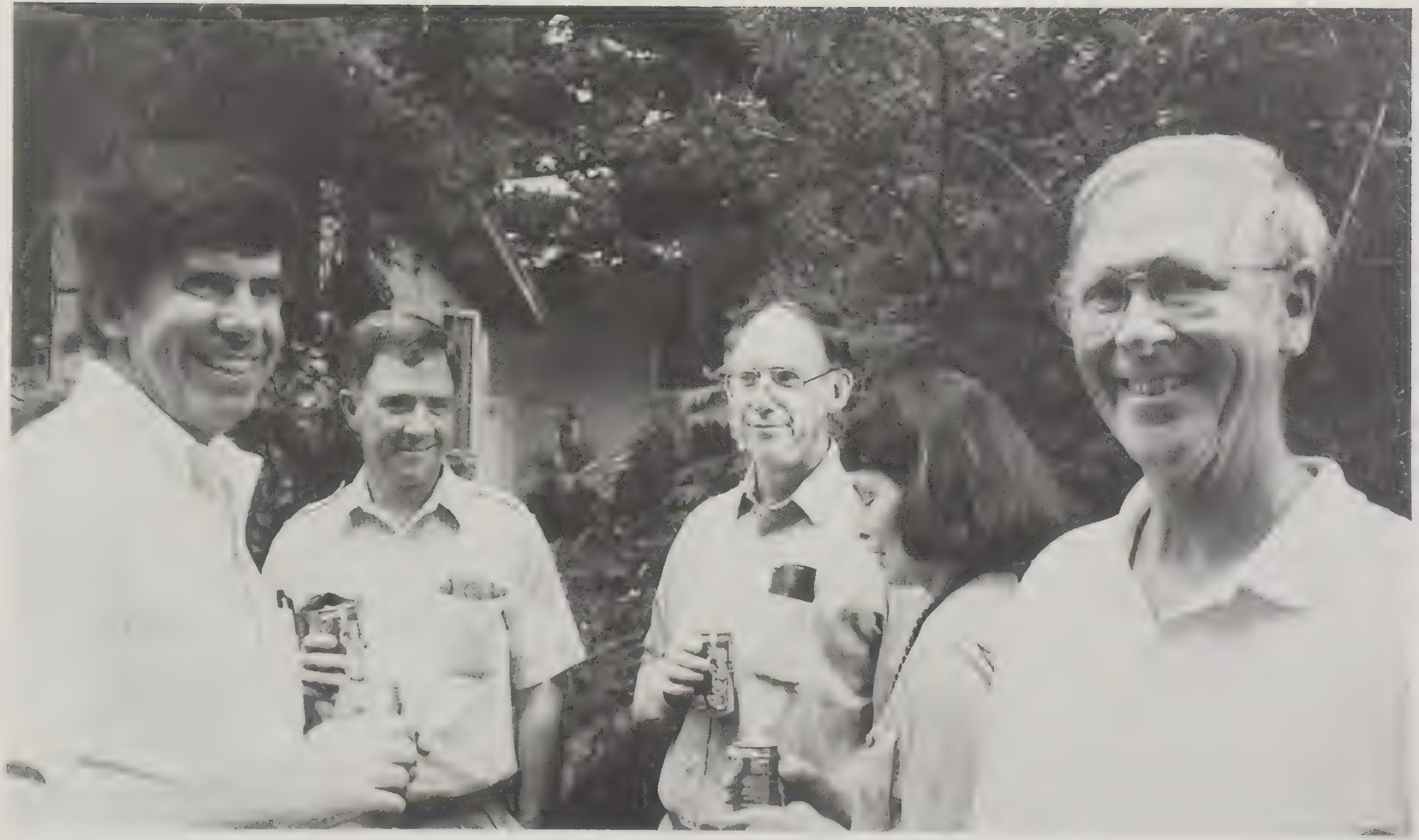

Fig. 10. Survivors of the 1960s, 2 July 1991. Left to right: Frank Gill, Dave Ligon, Bob Payne, Laura L. Payne, and Norm Ford. Courtesy of N. R. Ford.

the amateur community. He encouraged undergraduate students, and some went on to do graduate work with birds. Tordoff and the students of the late 1950s and 1960s were active in the field, observing and collecting many species not previously known in Michigan (Tordoff 1966). In 1970 he left the museum to be Director of the James Ford Bell Museum of Natural History at the University of Minnesota.

Andrew J. Berger (1915–1995) was a graduate student at the University of Michigan from 1946 to 1950. Although he worked with both Sutton and Van Tyne, Berger completed his Ph.D. with A. H. Stockard, a vertebrate anatomist in the Department of Zoology. His research on the comparative anatomy of cuckoos was based on specimens in the museum (Berger 1952, 1953a,b, 1954, 1955, 1960). His books include *Fundamentals of Ornithology* (Van Tyne and Berger 1959, 1976) with its student dedication "To those who have gone before, to those who are yet to come," a popular book *Bird Study* (1961), an avian myology text (George and Berger 1966) following an academic stay in India, and a text on human anatomy (Berger 1964). Berger held academic positions at the University of Michigan Medical School, then was Chair of the Department of Zoology at the University of Hawaii. At Michigan, he raised nestling songbirds with the advice of Sutton, and he was in the field with Van Tyne on the Kirtland's Warbler project (Jackson 1996). He was a major contributor to the Van Tyne library, donating more than 14,000 books and reprints, including dissertations on birds from Indian universities.

Robert B. Payne (1938–).—I became interested in birds when I lived in Burma with my father, who taught school and collected birds for a local museum and for USNM. Later I was an undergraduate student at the University of Michigan in 1958-1960 with Tordoff, Storer, and Test, completed Ph.D. graduate work at MVZ in the University of California with Alden H. Miller, did postdoctoral research at the University of Cape Town with J. M. Winterbottom, and taught at the University of Oklahoma with Sutton when he retired. I have been Curator of Birds at UMMZ since 1970, and as Professor of Zoology I teach courses in ornithology, birds of the world, and animal behavior.

My research with brood parasitic birds focuses on behavior, coevolution, and speciation in the parasitic finches *Vidua* and their estrildid hosts in Africa, where I have done fieldwork since 1965 to tape record songs and collect the birds (Fig. 11). Genetic materials from fieldwork are used to work out the evolution of the host-parasite associations. I use the museum aviaries to breed the *Vidua* to see how males learn their songs and females develop their preference to mate with males that mimic their

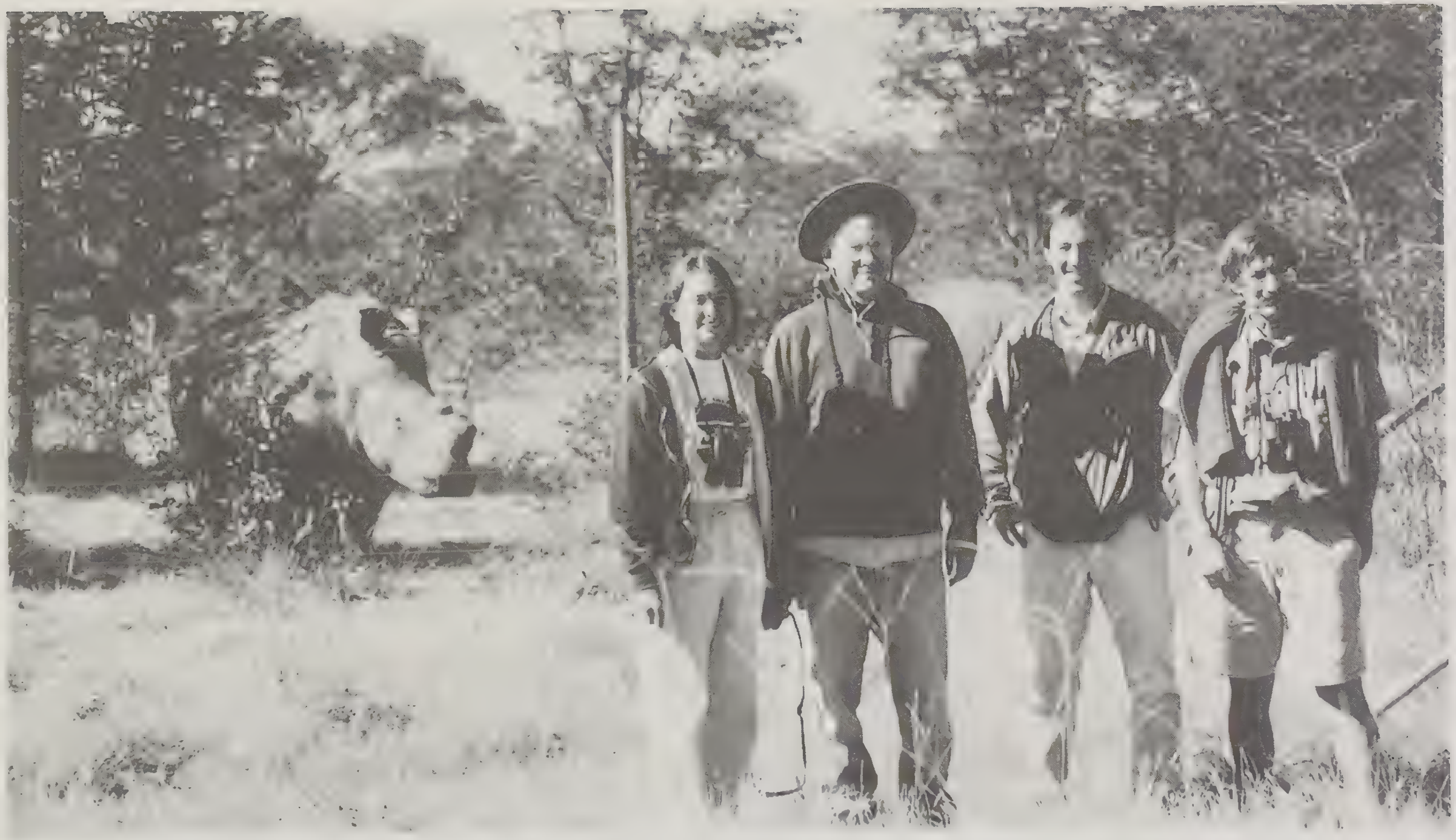

Fig. 11. Field ornithology near Livingstone, Zambia, on 14 May 1997. Left to right: Laura L. Payne, Bob Payne, Mike Sorenson, and guide Bob Stjernstedt, with background an indigobird call-site tree where a male Village Indigobird (*Vidua chalybeata*) mimicked the songs of Brown Firefinch (*Lagonosticta nitidula*).

foster species and to lay in the nests of their foster species. The experiments replicate the field situation when the parasites switch from one host to another and may become new species in the process (Payne 1973, 1977, 1997, 1998a,b, Klein et al. 1993, Payne et al. 1993, 1998, Payne and Payne 1994, 1995, Klein and Payne 1998). My other long-term fieldwork with Indigo Buntings (*Passerina cyanea*) in Michigan traces the dispersal, parentage, and breeding success of color-banded birds and the continuing cultural evolution of their songs. That study has been continuous for 22 years at the George Reserve and has involved 30 graduate and undergraduate students (Payne et al. 1981, 1988, Payne and Westneat 1988, Payne 1991, 1996, Payne and Payne 1993a,b, 1996, 1997, 1998). Postdoctoral researchers Kent L. Fiala and Jean L. Woods have worked with me with song behavior and breeding success of buntings and *Vidua* finches, and Nedra K. Klein and Michael D. Sorenson have worked with molecular genetics and speciation of the finches.

Mary C. McKitrick (1955–), anatomist and evolutionary biologist, came to UMMZ in 1986 after having worked in 1978 in the museum for a term as postgraduate research assistant, then completing a M.S. at the University of Arizona, a Ph.D. with Robert J. Raikow at the University of Pittsburgh, and a year of postdoctoral research at AMNH. She was Assistant Curator of Birds and Assistant Professor in the Department of Biology. She taught courses in introductory biology and evolution, did research with anatomical collections from 1986 to 1994, and used phylogenetic methods (McKitrick 1991a,b, 1992). Her research program included establishing a genetic and developmental basis for anatomical variation of the characters used in estimating phylogenies (McKitrick 1990a,b, 1994). Also, she initiated the project on computerization of data for the bird collection. After leaving Michigan she worked at the National Science Foundation and is now on the faculty at Smith College.

David P. Mindell (1953–), evolutionary biologist and molecular geneticist, had an early interest in birds as a falconer and wildlife biologist in Alaska (Mindell 1983), completed a Ph.D. in raptor migration studies with Clayton M. White at Brigham Young University, and held postdoctoral research positions at Harvard University and Tel Aviv University. In 1995 he moved from the University of Cincinnati to be Assistant Curator of Birds in UMMZ and Assistant Professor in the Department of Biology, where he teaches introductory biology, evolutionary biology, and a seminar in phylogenetic systematics. He is interested in higher-level systematics and uses molecular techniques to infer phylogenetic relationships among orders and families of birds, with a special interest in raptors (Mindell et al. 1997, Miranda et al. 1997), phylogenetic analysis of molecular genetic data (Mindell 1991), and rates of molecular evolution (Mindell and Thacker 1996). He has established a research laboratory for avian molecular genetics, systematics, and evolution. His recent book (Mindell 1997) brings together contemporary ideas and research on molecular evolution and avian systematics. Current research in his laboratory includes extraction, amplification and analyses of DNA from specimens in the bird collections.

GRADUATE STUDIES

Many graduate students as well as several undergraduate students have chosen the University of Michigan because of the bird collections, library, and field sites (the E. S. George Reserve near Ann Arbor, the University of Michigan Biological Station in northern Michigan, Nelson 1956, Pettingill 1974), as well as the laboratories and research programs of the curator-professors. Graduate students in avian systematics use specimens and genetic material already available, do research with behavior and evolution as well as work with specimens, and gain experience in managing the research collection. They are supported by research assistantships in the museum and by teaching fellowships in the Department. After completing their degrees, graduate students have gone on to professional careers in museums and academic institutions. Undergraduate students also have been active in the museum, where they are encouraged to work with the curators as well as with the graduate students and postdoctoral researchers.

Graduate research in the Division of Birds has largely been independent from the research of the Curators although in the same genre of research. Graduate students have completed dissertations in the areas of life histories (Ammann, Blick, Dixon, Howell, Hyde, Lunk, T. Nelson, Prescott, Preston, Staebler), ecology (Douglass, Hickey, Wong), sexual selection (Fiala, Hill, Howe, Irwin, Murray, Prum), behavioral ecology (Adkisson, Curry, Emlen, Gibbs, Heckenlively, Ingolfsson, Ligon, D. A. Nelson, Parr, Pepper, Sealy, Trainer, Will, Woods, Sloane), physiological ecology (Lasiewski, Dunn, Van't Hof), distribution (Slud), speciation (Gill, Hubbard, Klein), functional morphology (Orenstein, Owre, Sanders, Stettenheim, Zusi), and geographic and ecological variation and avian systematics (Brodkorb, Chu, Feduccia, Fisher, Ford, Humphrey, Jehl, Owen, Prum, Strauch, Tordoff) (Appendices 1, 2). Recent trends in graduate research have been away from descriptive life histories and distribution and towards the behavioral ecology and evolution of birds.

The bird collections and library, together with a nucleus of active students, have been essential in the graduate program in ornithology at the Museum of Zoology. The skins, skeletons, and fluid-preserved specimens available have provided materials for comparative research, often together with specimens available on loan and study from other museums (as listed in the Literature Cited and or in Appendix 2: Tordoff 1954b, Humphrey 1958, Zusi 1962, Slud 1964, Ford 1967, Ligon 1967, Feduccia 1969, 1974, 1977, Strauch 1976, 1978, Goodman and Meininger 1989, Prum 1990a,b, 1997, Klein 1992, Chu 1994, 1995, Irwin 1994). Some series are particularly valuable because they are complemented with field observations of behavior (Jehl 1968, Murray 1968, 1969, Hubbard 1969, Gill 1971, 1973, Johnston 1971, Payne 1973, 1982, Murray and Gill 1976, Hill 1993a,b, 1994, Payne and Payne 1994). Current graduate research includes work with social behavior and molecular systematics as well as with the collections. The collegial relationships with other Divisions in the Museum of Zoology, the surviving uncleansed non-biomedical ethnic faction of the Department of Biology, and the School of Natural Resources and Environment, and the curators, graduate students, and resources of the Division of Birds, continue to make the University of Michigan a rewarding venue for graduate studies in ornithology.

THE COLLECTIONS

The bird collections have specimens of 6387 (66%) of the 9672 species and 1780 (87%) of the 2057 genera of birds of the world recognized by Sibley and Monroe (1990) and are geographically diverse. Major regional and historical collections include the Steere birds from Brazil, the Philippines, and the Malay archipelago, the Koelz birds from India, extensive collections from North America, and 13,305 specimens from Mexico acquired by Van Tyne, Brodkorb, and their collectors. The systematic and regional specializations of this diversity reflect the interests of the curators and students, and the historical vagaries of contacts between them and collectors from outside the museum community.

The skin collection (nearly 180,000 specimens) and skeleton collection (nearly 24,000 specimens) are among the largest in the world (Banks et al. 1973, Wood and Schnell 1986), and the fluid anatomical collection (3300 fluids) represents most avian families (Wood et al. 1982). The egg collection of 2000 sets (Kiff 1979, Kiff and Hough 1985), during the past 20 years has received the most use on a per specimen basis for regional and life history studies and in historical analysis of the effects of pesticides on eggshell thinning. More than 2400 bird specimens are represented by frozen or buffer tissue samples for molecular genetics studies. Recently we have added tracheae and syringes, ciné and video sequences of behavior, and original tape recordings and photographs of birds. Currently we emphasize the collection of genetic material, either blood, muscle or fresh feathers, whenever possible along with the supporting specimen. The curators have selected, organized, and archived these materials and guided scientific users to the information and specimens. Skins, skeletons, spirit specimens, and eggs have been catalogued, and tissues for molecular genetics are catalogued when documented with these other specimens. The catalogue data have been entered on a computer data base. The labels and specimens are now being checked and compared with these data.

In 1891, the museum had 4308 bird skins of 1293 species, plus eggs, skeletons and nests (Steere, *in* Roth 1891). At that time the collection had 101 of 131 families of birds. In 1897 there were 5200 birds (Wood 1897), in 1906 there were 6500 birds, and in 1918 there were 12,100 birds, many from museum expeditions in the Great Lakes region. The number of specimens grew at an increasing rate through the 1930s, when professional collectors were active in North and South America and the museum curators also built up large series during their own fieldwork. New specimens decreased with WW II, but birds were collected by Michigan men in service (G. A. Ammann [Kiska, Aleutian Islands], N. S. Potter [the Philippines], and K. W. Prescott [Bismarck Archipelago, Bougainville] in the Pacific during WW II, and the next few years by J. T. Moyer [Japan]). The largest wartime series was taken by F. E. Ludwig in the Solomon Islands.

Historical trends in collecting are similar to those in other museums (Knox and Walters 1992, Lowther 1995), with the number of new specimens declining in the past 40 years. At UMMZ in recent years, a few hundred new bird specimens have been added each year (Fig. 12).

Who collected the birds? More than 1000 individual people have collected or salvaged the bird specimens that are now in the museum, and 196 have contributed 100 or more birds. The 26 most active collectors, each with more than 1000 birds (Table 1), account for 102,653 specimens, or more than half the total number in the collection. Many graduate students have added to the collections, and some people were associated with the museum in more than one capacity. Here I indicate their association during their most active period of collecting, with a bias towards a curatorial or student period: (a) eleven Curators of Birds, 20,061 specimens, or about 10% of the total of about 200,000 birds. (b) 30 graduate students, 14,840 specimens, about 7% of the total; undergraduate students have also added to the collections, seven have each added 100 or more birds. (c) 20 other museum personnel, 42,693 specimens, or 21% of the

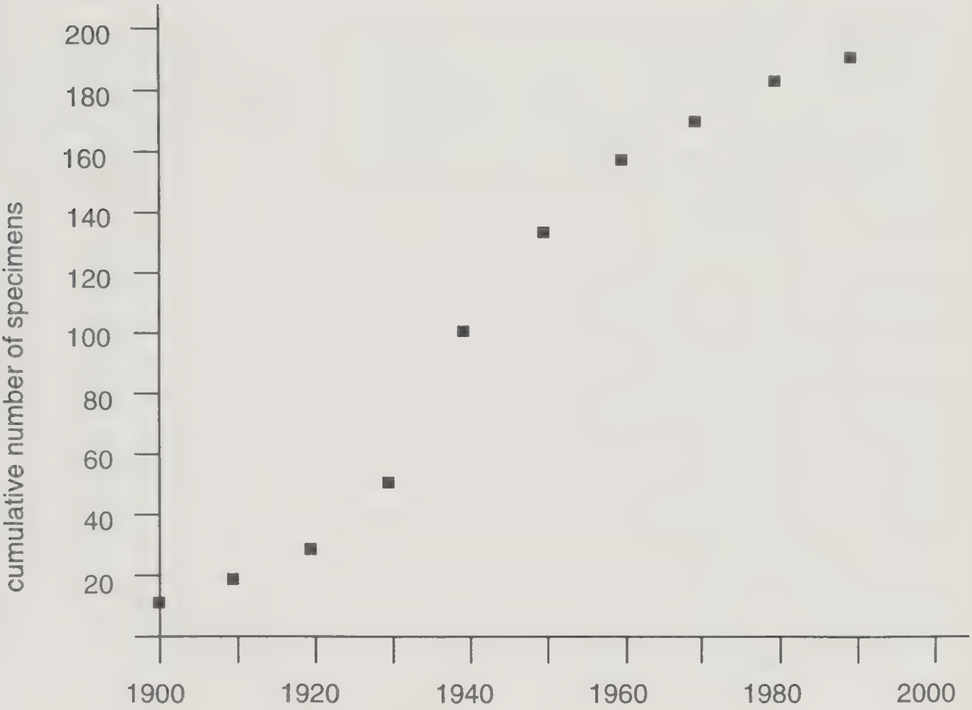

Fig. 12. Cumulative number of bird specimens acquired by UMMZ in the past hundred years.

total. (d) 14 friends of the museum each had more than 100 specimens, 13,866 specimens, or 7% of the total. In addition, other biologists have deposited specimens in UMMZ after their own research projects were completed. (e) The many field collectors who traveled around the world to collect birds and sold or donated their specimens to the museum account for nearly half of the total.

The UMMZ bird collections are the ongoing result of a cumulative process of long-term interest and support by many people. Students, alumni and other friends of the museum have provided more than half of the specimens by collecting, donating collections, or providing funds for purchase of collections and for field research. These collections are important for graduate education in systematic ornithology and for research. Together with the research collections in other museums, the collections that the curators have built over the past 160 years at the University of Michigan Museum of Zoology are an incomparable resource for the study of evolutionary processes of speciation and radiation and are irreplaceable records of past and the present biological diversity of birds.

Table 1. Collectors of bird specimens in the University of Michigan Museum of Zoology who have contributed more than 1000 specimens.

Rank	*Collector*	*no. specimens*
1.	Koelz, Walter N.	32,723
2.	Kimball, H. H.	15,737
3.	Schulze, Alberto	5,193
4.	Wood, Norman A.	4,568
5.	Brodkorb, Pierce	4,150
6.	Van Tyne, Josselyn	3,847
7.	Peet, Max Minor	3,815
8.	Williams, Henry V.	3,392
9.	Payne, Robert B.	3,084
10.	Shufeldt, Percy W.	2,572
11.	Slud, Paul	2,510
12.	Storer, Robert W.	2,075
13.	Rup Chand, Thakur	1,963
14.	Goodman, Steven M.	1,894
15.	Fargo, William G.	1,664
16.	Wing, Leonard W.	1,644
17.	Steere, Joseph B.	1,600
18.	Burleigh, Thomas D.	1,471
19.	Staebler, Arthur E.	1,418
20.	Case, Leslie D.	1,334
21.	Gill, Frank B.	1,307
22.	Strauch, Joseph G.	1,132
23.	Baddeley, M. O. E.	1,055
24.	Ludwig, Frederick E.	1,034
25.	Hubbard, John P.	1,020
26.	Test, Frederick H., and family	1,014

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APPENDIX 1

Graduate students in the Division of Birds

Zoology and Biology graduates with birds as their Ph.D. dissertation topics, completing degree under each Curator (co-chair, later chair or earlier chair in parentheses; all chair names italicized) as listed, or otherwise associated with the Division of Birds.

J. Van Tyne (VT): G. Andrew Ammann 1938, Pierce Brodkorb 1936, Donald W. Douglass 1934, Joseph J. Hickey 1949, Philip S. Humphrey 1955, A. Sidney Hyde 1937, William A. Lunk 1955, Robert M. Mengel (*WHB*) 1958, Theodora Nelson 1939, Kenneth W. Prescott 1950, Arthur E. Staebler 1949, Harrison B. Tordoff 1951.

R. W. Storer: Curtis S. Adkisson (*HT*) 1972, D. James Blick 1980, Jean M. Wright Cohn 1968, J. Alan Feduccia 1969, Norman L. Ford 1967, Frank B. Gill 1969, Donald B. Heckenlively (*HT*) 1974, James C. Howell (*HT*) 1972, John P. Hubbard 1967, Agnar Ingolfsson 1967, Douglas A. Nelson 1982, Ronald I. Orenstein 1977, Oscar T. Owre (*VT*) 1959, William C. Preston 1968, Susan W. H. Sanders 1967, Spencer G. Sealy 1972, Paul B. Slud (*VT*) 1960, Peter Stettenheim 1959, Joseph G. Strauch, Jr. 1976, Thomas C. Will (*BH*) 1986, Marina A. Wong (*DJ*) 1982, Richard L. Zusi (*VT*) 1959

H. B. Tordoff (HT): Clara L. Dixon 1972, Steven T. Emlen 1966, C. Dean Fisher 1970, David J. T. Hussell (*DWT*) 1970, Joseph R. Jehl, Jr. 1967, J. David Ligon 1967, Bertram G. Murray, Jr. 1967, Denis F. Owen 1961.

R. B. Payne (RBP): Robert L. Curry (*PG*) 1987, Erica H. Dunn 1973, Kent L. Fiala 1979, Geoffrey E. Hill 1991, Rebecca E. Irwin 1989, Nedra K. Klein 1992, Cynthia Sims Parr 1997, Richard O. Prum (*MM*) 1989, Sarah A. Sloane 1992, Jill M. Trainer 1985, Jean L. Woods 1994.

M. C. McKitrick (MM): Philip C. Chu 1993.

Bird students directed by chairs within UMMZ and outside the Division of Birds: *Richard D. Alexander*: Harry W. Power 1974, John W. Pepper 1996; *Francis C. Evans*: Louis J. Laux (*FES*) 1970; *Alexander G. Ruthven*: Josselyn Van Tyne 1928; *Donald W. Tinkle* (*DWT*): Henry F.

Howe (RBP, DJ) 1977; *Philip Myers*: H. Lisle Gibbs (*PG*) 1988; *William R. Dawson*: Robert C. Lasiewski 1962, Thomas J. Van't Hof 1992.

Co-chairs of graduate students above, where chair was in the Department of Biology (or Biological Sciences, or Zoology) and not in museum, or was in another Division of the museum: *William H. Burt* (*WHB*), *Peter Grant* (*PG*), *Brian Hazlett* (*BH*), *Daniel Janzen* (*DJ*), *Frederick E. Smith* (*FES*).

APPENDIX 2

Graduate students and their Ph.D. dissertations on birds completed in the University of Michigan Museum of Zoology

Adkisson, C. S. 1972. An analysis of morphological and vocal geographic variation in North American Pine Grosbeaks, *Pinicola enucleator* (Aves).

Ammann, G. A. 1938. Life history and distribution of the Yellow-headed Blackbird.

Blick, D. J., Jr. 1980. Advantages of flocking in some wintering shorebirds.

Brodkorb, P. 1936. A revision of the genus *Empidonax* Cabanis.

Chu, P. C. 1993. Historical examination of plumage maturation in the shorebirds (Aves: Charadriiformes), with special reference to the gulls (Charadriiformes: Larinae).

Cohn, J. M. W. 1968. The convergent flight mechanism of swifts (Apodi) and hummingbirds (Trochili) (Aves).

Curry, R. L. 1987. Evolution and ecology of cooperative breeding in Galapagos mockingbirds (*Nesomimus* spp).

Dixon, C. L. 1972. A population study of Savannah Sparrows on Kent Island in the Bay of Fundy.

Douglass, D. W. 1934. The spring migration of birds at Sand Point, Huron County, Michigan, 1931-1933.

Dunn, E. H. 1973. Energy allocation of nestling Double-crested Cormorants.

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2

Ornithology at the James Ford Bell Museum of Natural History and the University of Minnesota

Frank McKinney [1]
and
Robert M. Zink [1]

ABSTRACT.—The study of ornithology in Minnesota has been centered in the University of Minnesota's James Ford Bell Museum of Natural History, formerly called the Minnesota Museum of Natural History. Thomas Sadler Roberts, the father of Minnesota ornithology, is best known for *The Birds of Minnesota* published in 1932. His collections and observations provided the basis for much of mid-west ornithology. Walter Breckenridge, director of the Museum from 1946 to 1969, made major contributions to construction of the dioramas depicting Minnesota wildlife habitats. These dioramas, many with backgrounds painted by Francis Lee Jaques, are among the best in the world. Academic research and training in ornithology were initiated by Dwain Warner, and these activities have continued to be centered in the Bell Museum to the present. Kendall Corbin, Scott M. Lanyon, Frank McKinney, David Parmelee, John R. Tester, Harrison B. Tordoff, Robert M. Zink and their many graduate and post-doctoral students have made important contributions to diverse fields of ornithology. The Museum provides a home base for the Minnesota Ornithologists' Union and its journal *The Loon*. Museum staff, under the leadership of Harrison B. Tordoff, have played a major role in the restoration of the Peregrine Falcon to the midwest. The Bell Museum has important holdings of bird art, notably the most definitive collection of work by Francis Lee Jaques. Research on bird biology has been carried out in other units of the University of Minnesota, including The Raptor Center and the Avian Research Center.

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EARLY HISTORY OF THE MUSEUM

The original natural history museum at the University of Minnesota was established in 1872, when on March 1, Governor Horace Austin approved the bill which stated, "It shall be the duty of said Board of Regents (University of Minnesota) to cause proper specimens, skillfully prepared, secured and labeled, of all rocks, soils, ores, coals, fossils, cements, building stones, plants, woods, skins and skeletons of animals, birds, insects and fishes, and other mineral, vegetable and animal substances and organisms discovered and examined in the course of said surveys [the geological and zoological surveys of the state; also established in the same bill], to be preserved for public inspection free of cost, in the University of Minnesota, in rooms convenient of access and properly warmed, lighted, ventilated and furnished, and in charge of a proper scientific curator. . . ."

Initially, the collections consisted mostly of geological specimens which were housed in a room in a building called "Old Main." By 1890, the specimens were divided into geological, zoological, and botanical collections and moved to Science Hall (now known as Pillsbury Hall). By 1916, the collections and displays had grown to such an extent that the zoological material and staff were moved to new quarters in the Zoology Building, and the collection was known as the Zoology Museum. In 1928 the name was officially changed to the Museum of Natural History, and in 1939 it became the Minnesota Museum of Natural History.

Early in the 1930s efforts were begun to provide a separate building for the Museum, and in 1938 construction began on the present Museum building on the Minneapolis campus. It was in operation by 1940. History repeated itself, however, and by the late 1950s the new building was completely filled with collections and exhibits. Efforts to add a new wing to the building were begun, but it was not until 1965 that the wing was fully occupied. In 1967 the museum was renamed the James Ford Bell Museum of Natural History in honor of its major benefactor James Ford Bell, who for many years was the Chairman of General Mills.

HISTORY OF ORNITHOLOGY

The University's Natural History Museum has been a center for ornithology in the midwest since its early days, and in recent decades it has grown to international significance through its roles in teaching and research. The early years of the Museum and its role in midwest ornithology were described in detail by Thomas Sadler Roberts (1932). Roberts himself was a major player in this ornithological history. A medical doctor by training, he nonetheless can be considered the father of Minnesota ornithology (Krosche 1987). His extensive collections and natural history observations, culminating in his two-volume *Birds of Minnesota*, provided the basis for much of midwest ornithology. His observations serve to document the major changes in bird distribution and abundance that have occurred in Minnesota in the last 120 years.

Fig. 1. T. S. Roberts, the first Director of the University of Minnesota's Natural History Museum and author of *The Birds of Minnesota* (1932), is recognized as the father of Minnesota ornithology. (Photograph courtesy of the Bell Museum of Natural History).

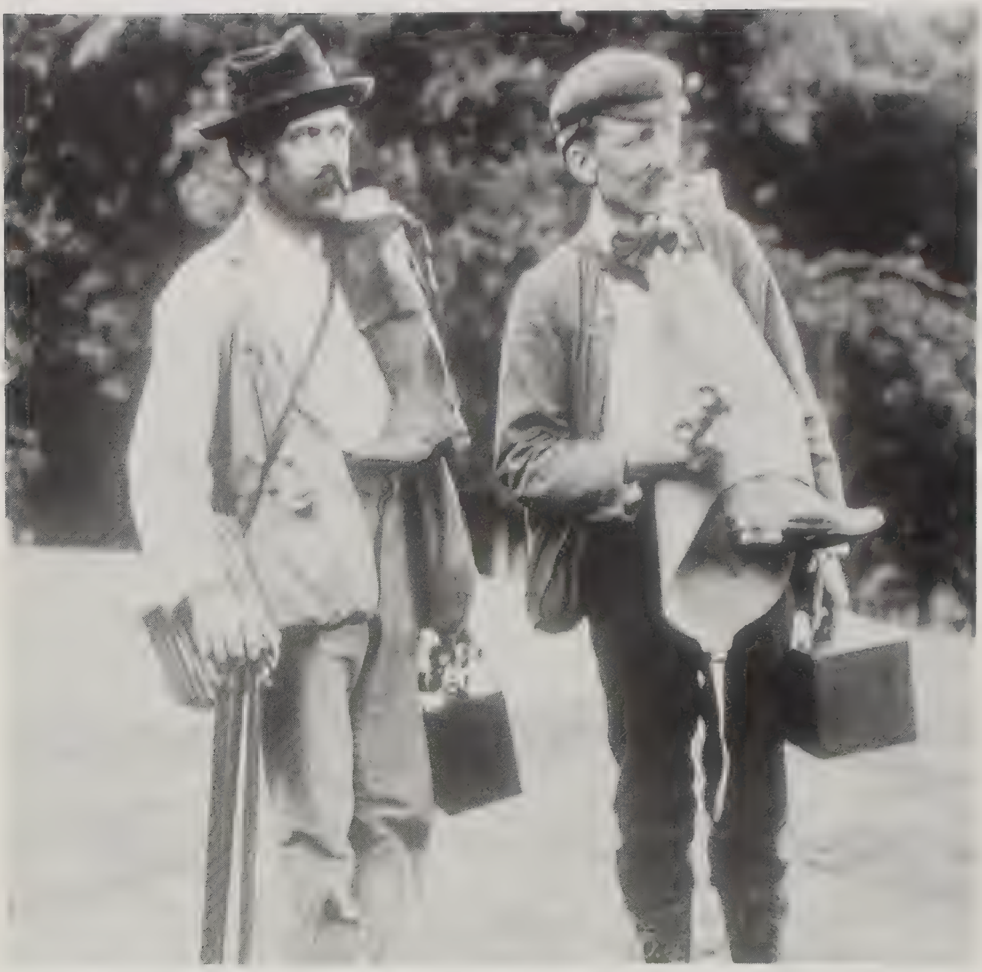

Fig. 2. Left to right. L. O. Dart and T. S. Roberts in the field at Long Meadows, Minnesota, on 14 June 1900. (Photograph courtesy of the Bell Museum of Natural History).

The journals that Roberts began as a teenager were transcribed and entitled "Shotgun and Stethoscope" (Krosche 1991). These journals provide a fascinating glimpse not only of Roberts and Minnesota's birdlife, but of life itself in Minneapolis in the late 1870s. For example, we learn that a common item in the Roberts family diet was the Passenger Pigeon (*Ectopistes migratorius*), obtained relatively easily within a few miles of home. Legend has it that Roberts was so dedicated to the study of Minnesota birds that he returned his binoculars to their case whenever he crossed the Iowa border.

Walter J. Breckenridge joined the Museum staff as preparator in 1926, and when Roberts died in 1946 Breckenridge became Director. During his

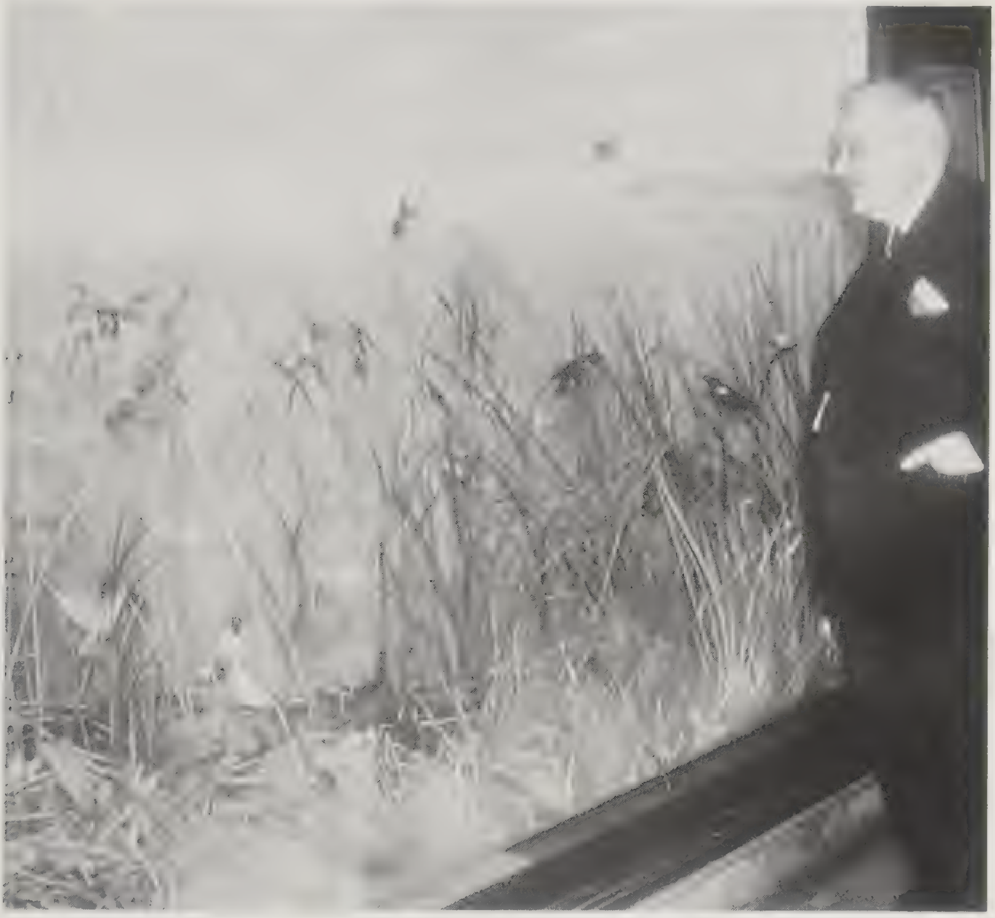

Fig. 3. T. S. Roberts with one of the Bell Museum's early dioramas depicting a scene at Heron Lake, Minnesota. (Photograph courtesy of the Bell Museum of Natural History).

tenure, 1946 to 1969, the Museum became established as a place where the public could become educated about natural history. Under Breckenridge, many of the Museum's fine exhibits were constructed, and "Breck" himself contributed much to their construction and obtained many of the specimens that were used (Luce et al. 1987). He also pioneered production of natural history films that were shown widely on Audubon Society Screen Tours and in Sunday programs narrated by Breck in the Museum auditorium.

Shortly after World War II, the Museum hired Dwain W. Warner, who had earned his Ph.D. at Cornell University. Dwain, who was curator of birds from 1947 to 1986, focused his research primarily in Mexico. Dwain

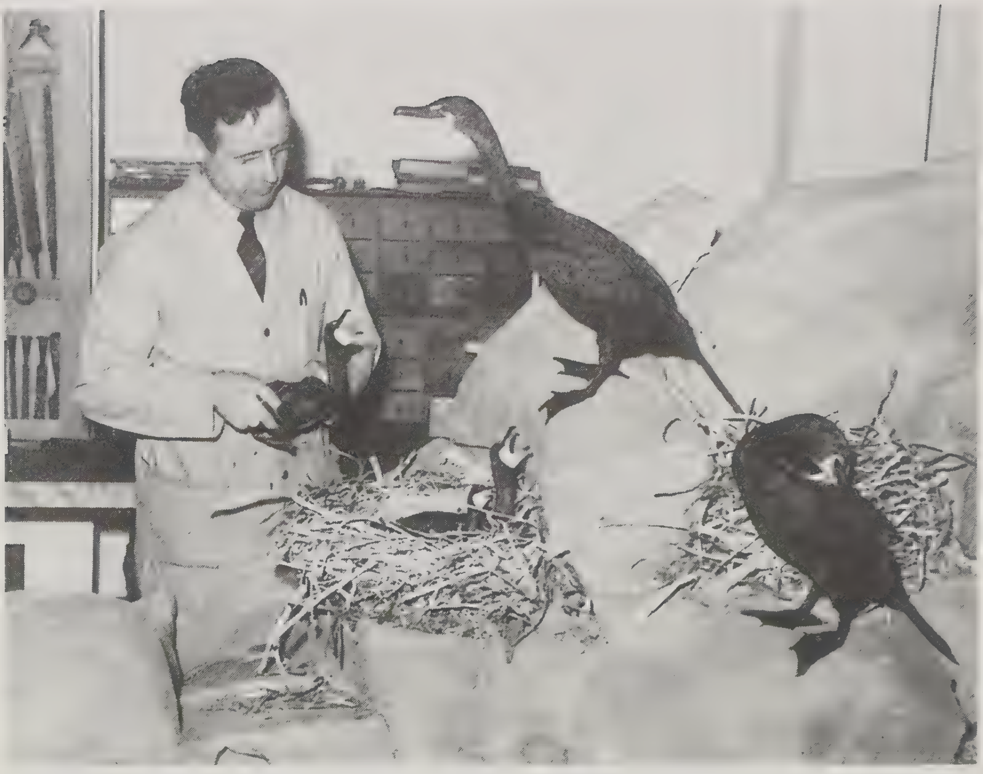

Fig 4. Walter J. Breckenridge, Director of the Minnesota Museum of Natural History 1946–1969, played an important role in constructing the Museum's dioramas depicting natural environments in Minnesota. (Photograph courtesy of the Bell Museum of Natural History).

and his students were among the first to recognize that site fidelity and territoriality on the wintering grounds put migrant birds at considerable risk because of habitat destruction in Mexico (Rappole and Warner 1976, 1980).

In 1956, ecologist John R. Tester became a staff researcher in the Museum and, with Donald B. Siniff, initiated an automatic radiotracking station at one of the University's field stations, Cedar Creek Natural History Area, where many techniques in telemetry involving birds and mammals were pioneered (Hodson 1985). This involved the creation of a Bioelectronics Laboratory, directed for many years by Larry B. Kuechle, as one of the Museum's unique facilities.

In 1964, Frank McKinney joined the Bell Museum research staff. Frank received his Ph.D. at Bristol University in England, trained at the Wildfowl Trust in England, and served on the staff of the Delta Waterfowl Research Station in Canada before moving south of the border. Subsequently, as Curator of Ethology in the Bell Museum and a faculty member in the Department of Ecology, Evolution and Behavior, Frank

Fig. 5. "Breck" made many trips to the Arctic to observe birds and make natural history films. This photograph was taken in the Northwest Territories. (Photograph courtesy of the Bell Museum of Natural History).

established a research program focusing on the comparative ethology of dabbling ducks that continued for 35 years. A major element in the mating systems of waterfowl proved to be forced extra-pair copulation, and this led to team research on sperm-competition and paternity (McKinney et al. 1984, McKinney and Evarts 1997). The American Ornithologists' Union awarded the William Brewster Memorial Award to Frank in 1994 for this research.

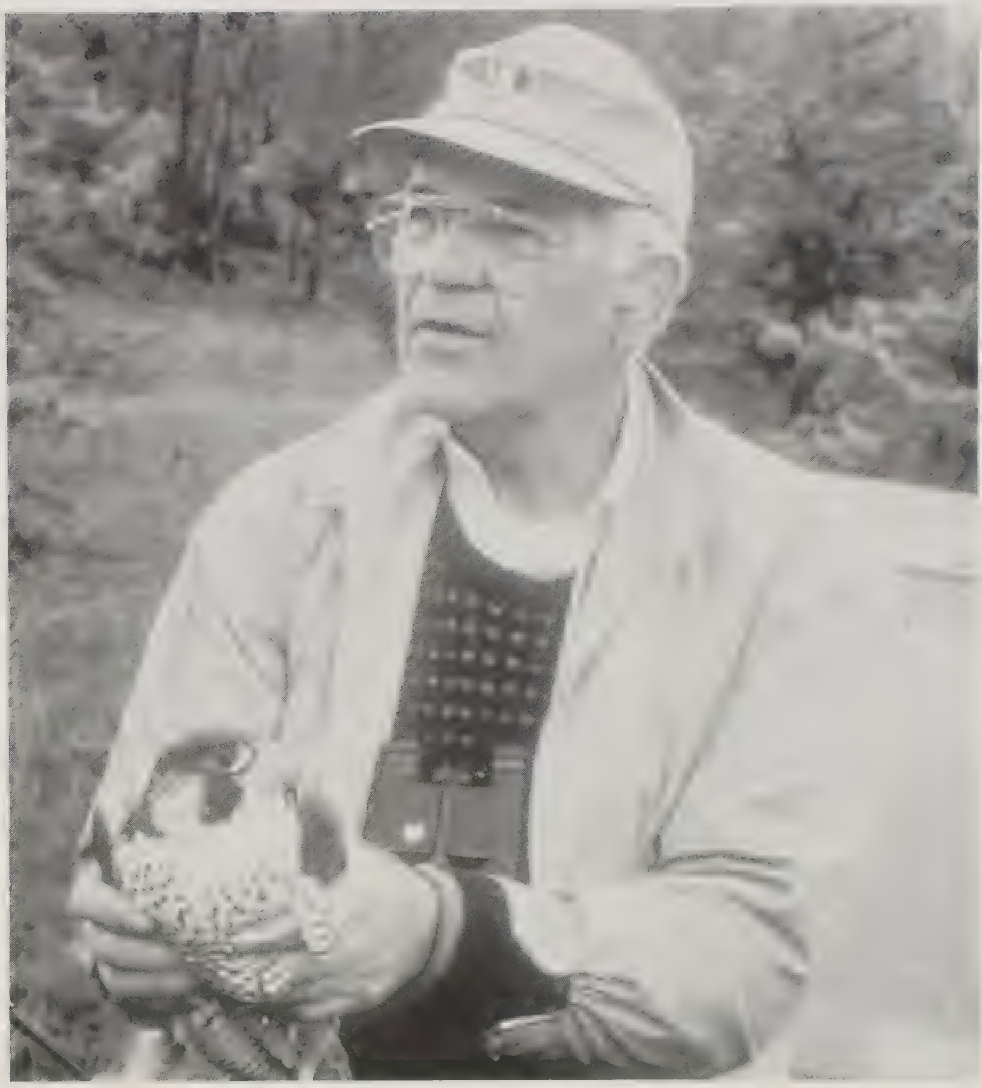

Fig. 6. Harrison B. ("Bud") Tordoff, Director of the Bell Museum of Natural History 1970–1983, played a leading role in restoring the Peregrine Falcon as a breeding bird in Minnesota. (Photograph courtesy of the Bell Museum of Natural History).

In 1970 Harrison "Bud" Tordoff left a faculty position at the University of Michigan to become the third ornithologist to assume directorship of the Bell Museum. During Tordoff's tenure (1970-1983), the Museum became one of the most active sites of ornithological research and graduate training in North America. Kendall Corbin and David F. Parmelee both joined the staff in 1970, bringing to five the number of active ornithologists working in the Museum. Among the post-doctoral researchers associated with the Museum at this time were Kimberly M. Cheng, who worked on sperm competition in Mallards (*Anas platyrhynchos*) (Cheng et al. 1983), Lewis W. Oring, who studied vocal communication in Green Sandpipers (*Tringa ochropus*) and Solitary Sandpipers (*T. solitaria*) (Oring 1968), and W. Roy Siegfried, from South Africa, who did research on birds both in Minnesota and in Manitoba (e.g., Siegfried 1976).

During this period, Museum ornithologists carried out research in many parts of the world. Corbin studied population genetics of both North and South American birds (e.g., Corbin 1987). McKinney worked on waterfowl behavior in South Africa, Australia, New Zealand, Argentina, and the Caribbean. Parmelee made numerous expeditions to both Arctic and Antarctic (Parmelee 1980, 1992). These global interests provided opportunities for Minnesota graduate students to travel widely and develop international perspectives in their research. Many of the graduate students of Warner, Tester, McKinney, and Tordoff, Corbin and Parmelee became prominent ornithologists, and/or hold research positions in avian conservation and management (Appendix I).

THE BRECKENRIDGE CHAIR

In 1983, parasitologist Donald Gilbertson succeeded Tordoff as Director of the Bell Museum, and it was Gilbertson who provided leadership in planning for an endowed chair in ornithology. By the early 1990s, the Museum had garnered sufficient resources to create the Breckenridge Chair in Ornithology, and the search for a person to fill the position was carried forward by interim directors Elmer C. Birney (1991–1992) and Kendall Corbin (1992–1994). Eventually the chair was filled in 1993 by Robert M. Zink. Zink earned his B.S. at the University of Minnesota. Ironically it was Breckenridge himself who provided the initial help in starting Zink's ornithological career by directing him to Dwain Warner's lab. As an undergraduate Zink worked extensively in the labs of Dwain Warner and David Parmelee. Zink earned his Ph.D. in 1983 at University of California Berkeley (with Ned K. Johnson), and after a Chapman Post Doctoral Fellowship at the American Museum of Natural History, was hired on the faculty at Louisiana State University in Baton Rouge. Zink brought a program in systematics and molecular evolution to the Bell Museum (e.g., Zink 1996). After Parmelee's retirement in 1992, Zink also assumed the position of Curator of Birds.

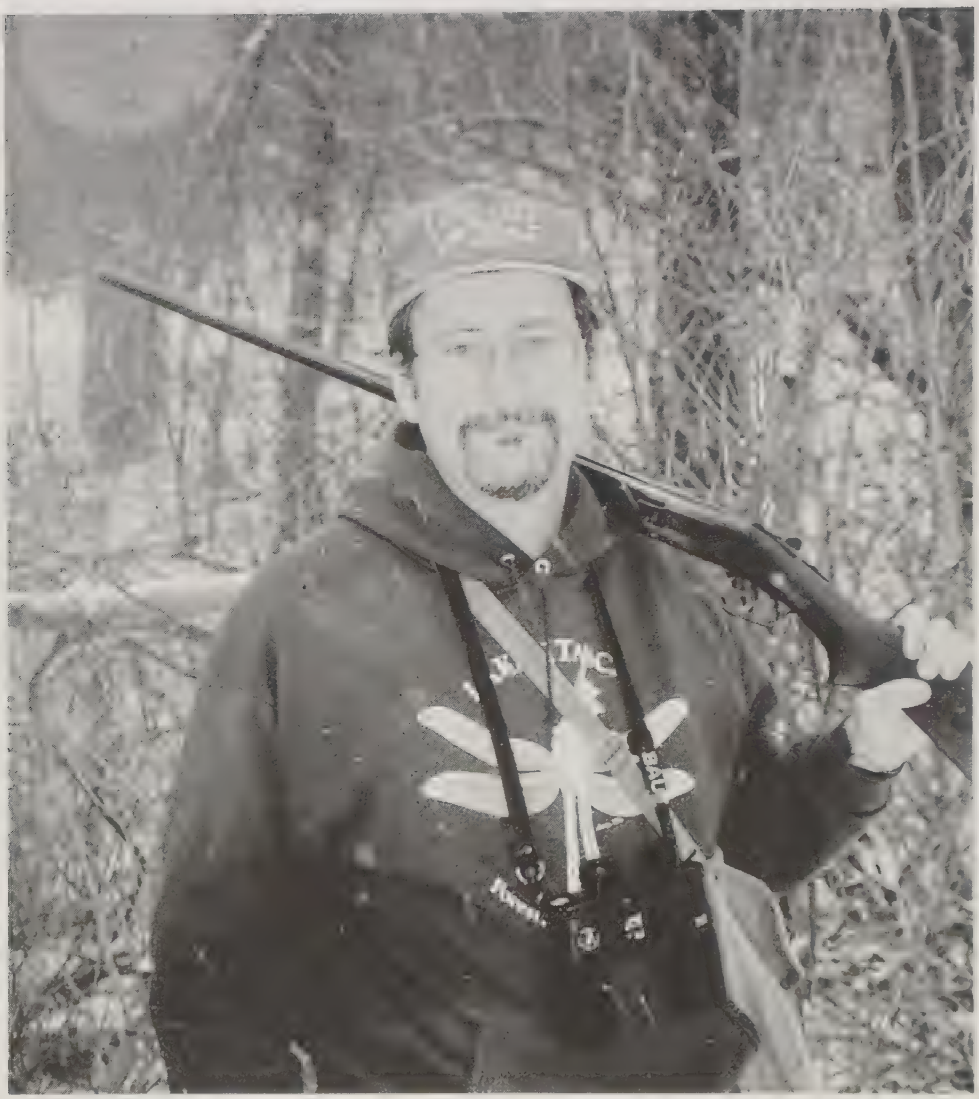

Fig. 7. Robert M. Zink was appointed to the Breckenridge Chair in Ornithology in 1993.

At the time of Zink's arrival, the museum curators moved from the main Bell Museum building on the Minneapolis Campus to join their faculty colleagues in the Department of Ecology, Evolution, and Behavior, in a new building on the St. Paul Campus. Thus, the Museum became a split entity, with the Minneapolis public exhibits, outreach, and art collections staying put, and the curators, their laboratories, and scientific collections moving to St. Paul.

Fig. 8. Scott M. Lanyon was appointed Director of the Bell Museum of Natural History in 1995.

THE BELL MUSEUM TODAY

The latest era of the Museum began in 1995 when Scott M. Lanyon left his position as Head of the Department of Birds at the Field Museum of Natural History in Chicago to become Director of the Bell Museum. He received his Ph.D. at Louisiana State University under the guidance of J. V. Remsen, Jr. and after graduate school joined the staff at the Field Museum. Lanyon, who comes from a strong ornithological background (his father is

Wesley Lanyon, formerly of the American Museum of Natural History), set about to expand the public education programs and to unite the University's Systematic collections. In addition, he maintains an active research program in molecular systematics (e.g., Lanyon 1994). Kevin E. Omland carried out post-doctoral research in Scott's lab in 1997–1998.

Today the Bell Museum provides a stimulating environment for graduate students in ornithology. Strong emphasis on scientific collecting, curating traditional specimens (including skeletons and tissue samples), and morphometrics is maintained in addition to active research in molecular systematics. Ornithology graduate students also interact with curators and other students in mammalogy, ichthyology, entomology, and plant biology, resulting in rich educational and research opportunities in systematics, biogeography, and molecular evolution.

THE BIRD COLLECTION

The bird collection houses approximately 46,000 specimens and continues to grow. Main strengths are collections from Minnesota, Mexico, and the Philippines (including about one-third of the specimens from the Menage expedition). Most specimens are traditional study skins although in recent years skeletons, spread wings, and tissue samples are routinely preserved.

BIRD ART AT THE BELL MUSEUM

Several important bird artists have left their mark on the Bell Museum. Best known is undoubtedly Francis Lee Jaques, a Minnesota native who contributed plates to Roberts' 1932 book *The Birds of Minnesota* and painted many of the backgrounds for the Museum's dioramas (Jaques 1973, Luce and Andrews 1982, Luce et al. 1987). When the dioramas were being planned, James Ford Bell traveled to museums around the country and picked Jaques (who was working at the American Museum of Natural History in New York at the time) as the best artist he could find to paint the backgrounds. As a result, the Jaques backgrounds at the Bell Museum are widely acclaimed as among the best in the world. After Lee Jaques died in 1969, Florence Jaques donated her husband's drawings and paintings to form the basis of a new Jaques Gallery in the Museum. The Bell Museum now owns the most definitive and growing collection of Jaques works.

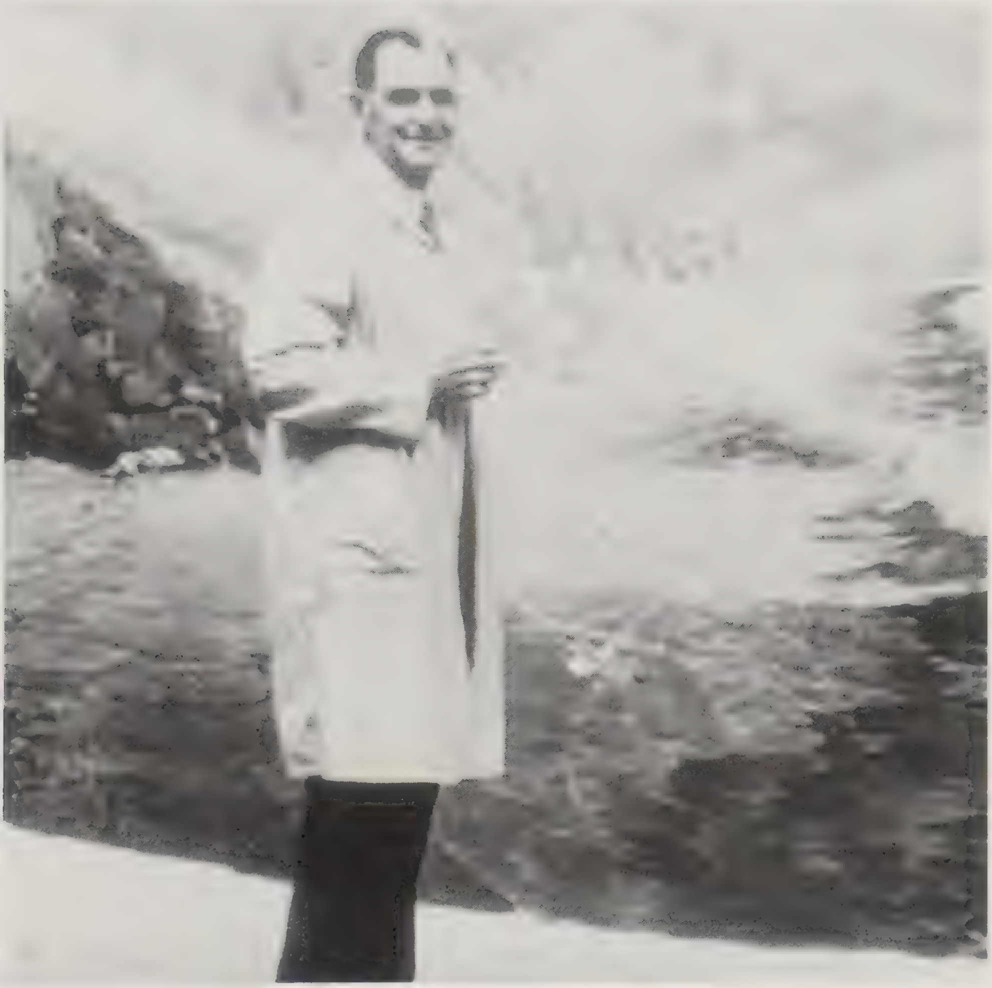

Fig. 9. Francis Lee Jaques working on the background for the wolf diorama in the Bell Museum in June 1940. (Photograph courtesy of the Bell Museum of Natural History).

The first exhibit visitors see on entering the Museum is the Swallow-tailed Kite diorama, with a spectacular background view over the Mississippi Valley painted by Jaques. This beautiful diorama, completed in 1946, was commissioned by George M. Sutton as a gift in honor of his mother Lola M. Sutton.

The connection between the Museum and bird art remains very strong. Walter Breckenridge continues to be a productive artist in his

Fig. 10. David and Jean Parmelee on one of their ornithological cruises in Antarctic waters. (Photograph courtesy of the Bell Museum of Natural History).

retirement years. The artistic work of David F. Parmelee (1925-1998), a student of George Sutton while both were in Oklahoma, is especially associated with his polar research while he was at the Bell Museum. His work is well represented in his 1992 book *Antarctic Birds*. The Museum is well known for the presentation of major shows of North American natural history art. A landmark development was creation of the travelling exhibit *Pioneers of Bird Illustration* by Don Luce, Curator of Exhibits. The exhibit opened in December 1989, and featured woodblocks by Thomas Bewick and 25 of Audubon's finest prints from the Museum's unbound copy of the double-elephant folio edition of *The Birds of America* (English 1989).

BIRD CONSERVATION

The most noteworthy contribution to avian conservation that has involved Bell Museum ornithologists is the restoration of the Peregrine Falcon (*Falco peregrinus*) to the midwest. Peregrines had been extirpated over the whole of eastern North America south of the Arctic by 1960, through disruption of breeding by the insecticide DDT and its relatives. The original population in the midwest was estimated to be about 50 pairs, all nesting on cliffs, primarily along the shores of Lake Superior and along the Mississippi River and its tributaries. Twenty years ago, Bud Tordoff and Patrick T. Redig, Director of the University's Raptor Center, coordinated a restoration effort involving captive breeding and release by hacking. Beginning in 1982, about 800 young peregrines produced by private breeders were released and, by 1997, 90 pairs of falcons were on territories throughout the Midwest. Interestingly, three-quarters of these birds are nesting on buildings, smokestacks, or bridges. Two dozen pairs are once again nesting on the Lake Superior cliffs, but the new birds have not been able yet to regain the river cliffs from Great Horned Owls (*Bubo virginianus*) (Tordoff and Redig 1997). The spectacular success of this and other restoration projects is reflected in removal of the peregrine from the federal Endangered Species list in 1998.

OTHER CENTERS OF AVIAN RESEARCH IN THE UNIVERSITY

Fisheries and Wildlife.—Research on waterfowl and upland game bird management has a long history at the University of Minnesota. Under the leadership particularly of William H. Marshall, for many years the Director of the Itasca Biological Station in central Minnesota, and Milton W. Weller who served as Head of the Department of Entomology, Fisheries and Wildlife from 1974 to 1982, Minnesota trained many wildlife biologists and contributed importantly to development of the field. Weller is especially well-known for his research on waterfowl and wetlands in North America and for his pioneering review of island waterfowl in all parts of the world (Weller 1980, 1987). Among his other contributions, for a number of years Marshall directed the long-term research program on Ruffed Grouse (*Bonasa umbellus*) led by Gordon Gullion at Cloquet Forestry Center situated 21 miles west of the west end of Lake Superior (Gullion and Martinson 1984). James Cooper, a well known authority on the biology of the Canada Goose (*Branta canadensis*), currently teaches waterfowl management.

Today, Francesca Cuthbert and David E. Andersen represent ornithological interests in the Department of Fisheries and Wildlife. Both have played leading roles in development of an inter-disciplinary graduate program in Conservation Biology which is attracting many students with primary interests in avian conservation. Francie Cuthbert and her graduate students have made major contributions to conservation of the midwest populations of Piping Plover (*Charadrius melodus*) and Common Tern (*Sterna hirundo*).

The Raptor Research Center—A major raptor rehabilitation and research center was established in 1974 by Gary Duke and Patrick Redig within the College of Veterinary Medicine. Since 1988, the Center has been housed in a modern facility named the Gabbert Raptor Center in honor of Don Louise Gabbert, the major contributor to the building. This is one of the most active centers of its kind in North America, fulfilling important educational, veterinary, and conservation roles. Much of the Center's conservation work has centered on rehabilitation and restoration of the Peregrine Falcon, Bald Eagle (*Haliaeetus leucocephalus*), and Osprey (*Pandion haliaetus*).

Avian Research Center—In 1990, faculty from a number of departments in the University of Minnesota created an Avian Research Center to promote collaborative research and training, primarily in the areas of poultry production, veterinary medicine, wildlife management, and avian conservation. Much of the research of participants in the Center is directed at problems of the Minnesota poultry industry, but increasing communication among faculty on the St. Paul Campus has led to fruitful collaborations.

Leading researchers in the Avian Research Center, many widely known in ornithological circles, include Gary Duke (digestive physiology), Mohamed E. El Halawani (neuroendocrine regulation of reproduction), Patrick T. Redig (avian surgery, diagnostics, raptor rehabilitation), Robert N. Schoffner (genetics, chromosome morphology), David E. Andersen (conservation and management of wild birds), James Cooper (conservation and management of geese and swans), Francesca Cuthbert (conservation, notably of plovers and terns), Thomas H. Nicholls (conservation and management, notably of owls and songbirds), and Richard E. Phillips (neurophysiology and behavior of plovers).

The Department of Ecology, Evolution, and Behavior provides an academic home for several faculty already mentioned in connection with other research centers (Corbin, Lanyon, McKinney, Phillips, Zink).

MINNESOTA ORNITHOLOGY

The State has an especially rich tradition in amateur bird study much of which had its "home" in the Bell Museum. The quarterly journal of the Minnesota Ornithologists' Union *The Loon* (first published in 1929 as *The Flicker*), which publishes observations and reviews primarily on the distribution, status, and conservation of birds in the State, has the Museum as its permanent address. *The Loon*, until very recently under the long-term editorship of Robert B. Janssen, stands among the best of the regional journals in North America. Two major works, updating known information on the distribution and status of Minnesota birds, have been published by the University of Minnesota Press and the Bell Museum (Green and Janssen 1975, Janssen 1987). The Minnesota Ornithologists' Union (MOU) has strict criteria for accepting reports of bird sightings in the State, and Museum curators (currently Bud Tordoff) help to maintain high standards by serving on the MOU Records Committee.

AOU SERVICE AND MEETINGS HOSTED

In 1997, the University of Minnesota hosted the One-Hundred-and-Fifteenth Stated Meeting of the American Ornithologists' Union on the Minneapolis-St. Paul campus. Hosts for the meeting were Francesca Cuthbert, Scott Lanyon, and Bob Zink. Previously, the 1950 meeting was hosted by the Minnesota Ornithologists' Union and the University of Minnesota. Walter Breckenridge was chair of the local committee for this meeting, and lecture sessions were held in the Minnesota Museum of Natural History.

Four Museum faculty have served as officers of the AOU. Harrison B. Tordoff was President in 1978-80, Kendall W. Corbin was Secretary in 1978-81, Robert M. Zink was Vice-President in 1996-97, and Scott M. Lanyon was Vice-President in 1997-98.

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APPENDIX I

Theses in Ornithology by Graduate Students Associated with the Bell Museum

(A) Ph.D. DEGREES

ANDERSON, M. G. 1984. Social behavior of breeding Canvasbacks (*Aythya valisineria*): male and female strategies of reproduction. (FM)

ARCHIBALD, H. L. 1973. Spring drumming activity and space use of Ruffed Grouse. (JRT)

ASKINS, R. 1981. Foraging ecology of temperate-zone and tropical woodpeckers. (HBT)

BALL, I. J. JR. 1973. Ecology of duck broods in a forested region of north-central Minnesota. (JRT)

BARROWCLOUGH, G. 1980. Genetic differentitaion in the *Dendroica coronata* complex. (KWC)

BERNSTEIN, N. P. 1982. Activity patterns, energetics, and parental investment of the antarctic Blue-eyed Shag (*Phalacrocorax atriceps bransfieldensis*). (DFP)

BLOCKSTEIN, D. 1986. Reproductive behavior and parental investment of Mourning Doves (*Zenaida macroura*). (HBT)

BREWER, G. L. 1990. Parental care behavior of the Chiloe Wigeon (*Anas sibilatrix*). (FM)

BRUGGERS, D. 1988. The behavior and ecology of the Common Raven in northeastern Minnesota. (HBT)

BUITRON, D. P. 1982. Behavior of Black-billed Magpies during the breeding season. (FM)

BURGER, J 1972. Breeding adaptations of Franklins' Gull (*Larus pipixcans*) to a marsh habitat. (HBT)

BURNS, J. T. Mate-switching in House Wrens. (FM)

CARTER, M. D. 1984. The social organization and parasitic behavior of the Bronzed Cowbird in south Texas. (DWW)

CUTHBERT, F. J. 1981. Caspian tern colonies in the Great Lakes: responses to an unpredictable environment. (HBT)

DERRICKSON, S. R. 1977. Aspects of breeding behavior in the Pintail (*Anas acuta*). (JRT)

DICKERMAN, R. W. 1961. The Song Sparrows of the Mexican Plateau. (DWW)

DYER, M. I. 1964. Radar and morphometric studies on transient Red-winged Blackbird populations (DWW)

ELDRIDGE, J. L. 1987. Ecology of migrant sandpipers in mixed-species foraging flocks. (HBT)

ELIASON, B. 1986. Mating system, parental care, and reproductive success in the Blackpoll Warbler (*Dendroica striata*) (DWW)

EVARTS, S. 1990. Male reproductive strategies in a wild population of Mallards (*Anas platyrhynchos*). (FM)

FRASER, W. R. 1989. Kelp Gull use of the Antarctic limpet *Nacella concinna*. (DFP)

GILMER, D. S. 1971. Home range and habitat use of breeding Mallards (*Anas platyrhynchos*) and Wood Ducks (*Aix sponsa*) in north-central Minnesota as determined by radio tracking. (JRT)

GRAUL, W. D. 1973. Breeding adaptations of the Mountain Plover (*Charadrius montanus*). (FM)

HOWE, M. A. 1972. Pair bond formation and maintenance in Wilson's Phalarope, *Phalaropus tricolor*. (FM)

JOHNSON, K. P. 1997. The evolution of behavior in the dabbling ducks (Anatini): a phylogenetic approach. (FM)

KAUFMANN, G. W. 1971. Behavior and ecology of the Sora (*Porzana carolina*) and the Virginia Rail (*Rallus limicola*). (FM)

KERMOTT, L. H. III. 1982. Breeding behavior of the Sharp-tailed Grouse. (HBT)

KLICKA, J. T. 1999. A Molecular perspective on the evolution of North American songbirds. (RMZ)

LEFEBVRE, E. A. 1962. Energy metabolism in the Pigeon (*Columba livia*) at rest and in flight. (DWW)

MCINTYRE, J. M. 1975. Biology and behavior of the Common Loon (*Gavia immer*). (DWW)

MILLER, J. H. 1987. A study of aggressive interactions in a mixed larid breeding colony in Minnesota. (DFP)

MOCK, D. W. 1976. Social behavior of the Great Blue Heron and Great Egret. (FM)

NICHOLLS, T. H. 1973. Ecology of Barred Owls as determined by an automatic radio-tracking system. (DWW)

NUECHTERLEIN, G. L. 1980. Courtship behavior of the Western Grebe. (FM)

PIETZ, P. J. 1984. Aspects of the behavioral ecology of sympatric South Polar and Brown skuas near Palmer Station, Antarctica. (DFP)

PORT, J. L. 1998. Reproductive strategies of an arboreal dabbling duck: the Speckled Teal (*Anas flavirostris*) in eastern Argentina. (FM)

RAMOS, M. A. 1983. Seasonal movements of bird populations at a neotropical study site in southern Veracruz, Mexico. (DWW)

RAPPOLE, J. H. 1976. A study of evolutionary tactics in populations of solitary avian migrants. (DWW)

ROBINSON, G. 1960. Some effects of the hormone prolactin on the reproductive behavior of the Brown-headed Cowbird (*Molothrus ater*). (DWW)

SORENSON, L. G. 1990. Breeding behaviour and ecology of a sedentary tropical duck:the White-cheeked Pintail (*Anas bahamensis bahamensis*). (FM)

SORENSON, M. D. 1990. Parasitic egg laying in Redhead and Canvasback ducks. (FM)

STROHMEYER, D. L. 1967. The biology of renesting by the Blue-winged Teal (*Anas discors*) in northwest Iowa. (JRT)

WINKER, K. 1991. Nearctic passerine migrants: nonbreeding ecology and habitat selection. (DWW)

WOODWORTH, B. L. 1995. Ecology of the Puerto Rican Vireo and Shiny Cowbird in Guanica Forest, Puerto Rico. (FM)

WUNDERLE, J. M. JR. 1980. Breeding ecology of the Bananaquit (*Coereba flaveola*) on Grenada. (KWC)

(B) M.Sc. DEGREES

ABRAHAM, R. L. 1971. Vocalizations of the Mallard (*Anas platyrhynchos*). (FM)

BARRETT, J. 1973. Breeding behavior of captive Mallards. (FM)

BLOCKSTEIN, D. E. 1982. Nesting behavior of Mourning Doves (*Zenaida macroura*) in Minnesota. (HBT)

BREWER, G. 1988. Displays and breeding behavior of captive Ringed Teal (*Callonetta leucophrys*). (FM)

BURNS, J. T. 1979. Social organization of Short-billed Marsh Wrens. (FM)

CHRONISTER, C. D. 1985. Egg-laying and incubation behavior of Black-bellied Whistling Ducks. (FM)

DERRICKSON, S. R. 1975. Mobility and habitat use of breeding Pintails (*Anas acuta*). (JRT)

EDINGER, B. 1985. Limited hybridization and behavioral differences among sympatric Baltimore and Bullock's orioles. (KWC)

ELDRIDGE, J. L. 1978. Observations on displays of the Chilean Torrent Duck, *Merganetta armata armata*. (FM)

FIELD, R. 1970. An analysis of social courtship in the Mallard (*Anas platyrhynchos*). (FM)

FRY, A. J. 1997. Neutrality, analysis of molecular variance, and Song Sparrow (*Melospiza melodia*) population history inferred from mitochondrial DNA sequences. (RMZ)

MARCH, J. R. 1967. Dominance relations and territorial behavior of captive Shovelers, *Anas clypeata*. (JRT)

MAXSON, S. J. 1974. Activity, home range, and habitat usage of female Ruffed Grouse during the egg-laying, incubation, and early brood periods as determined by radiotelemetry. (DFP)

MOCK, D. 1972. Social behavior of the Great Blue Heron during pair formation. (FM)

NEILSON, D. R. 1983. Ecological and behavioral aspects of the sympatric breeding of the South Polar Skua (*Catharacta maccormicki*) and the Brown Skua (*Catharacta lonnbergi*) near the Antarctic Peninsula. (DFP)

PEARCE, A. N. 1999. Behavioral evidence on the systematic relationships of the Garganey and Silver teals. (FM)

RAVELING, D. G. 1963. Variation among samples of Tennessee Warblers (*Vermivora peregrina*) killed in a nocturnal migration at a TV tower. (DWW)

RIMMER, C. C. 1986. Patterns and timing of the definitive prebasic molt in Yellow Warblers (*Dendroica petechia*). (DFP)

STALHEIM, P. S. 1974. Behavior and ecology of the Yellow Rail (*Coturnicops noveboracensis*). (FM)

STAUS, N. S. 1997. Ecology and conservation of the West Indian Whistling-Duck in the Bahamas. (FM)

STROHMEYER, D. L. 1967. The biology of renesting by the Blue-winged Teal (Anas discors) in northeast Iowa. (JRT)

WECKSTEIN, J. D. 1997. Historic hybridization as revealed by mitochondrial DNA paraphyly in White-crowned and Golden-crowned sparrows. (RMZ)

WINKER, K. 1989. The Wood Thrush (Catharus mustelinus) on its wintering grounds in southern Veracruz, Mexico. (DWW)

WUNDERLE, J. M. Jr. 1976. Species and individual recognition of song in the Common Yellowthroat. (KWC)

Graduate student advisors: Kendall W. Corbin (KWC), Frank McKinney (FM), David F. Parmelee (DFP), John R. Tester (JRT), Harrison B. Tordoff (HBT), Dwain W. Warner (DWW), Robert M. Zink (RMZ).

3

The History of Ornithology at Yale University and the Peabody Museum of Natural History

Frederick R. Davis [1]

ABSTRACT.—The history of ornithology at Yale University and the Peabody Museum of Natural History spans more than a century. It begins with discoveries in avian paleontology by O. C. Marsh in the nineteenth century shortly after the museum was founded by Benjamin Silliman with funds from George Peabody. The early history of the Peabody Museum indicates a commitment to paleontology (both vertebrate and invertebrate), geology, and invertebrate zoology (under the direction of A. E. Verrill).

It was not until the arrival of Stanley C. Ball in 1926, that Yale had a dedicated ornithologist. After two decades of modest collection development and limited research, Ball was joined by S. Dillon Ripley whose efforts greatly expanded the ornithological collections. Ripley's research on the birds of India and Africa, as well as reviews of bird families (thrushes, babblers, and rails), reflected classical approaches in ornithology. Ripley used his formidable skills as a naturalist and diplomat to bring to Yale nearly 100,000 specimens, major financial donations for the bird collections, the ornithology library, and a new building to house the collections. Towards the end of Ripley's tenure at Yale, a science advisory committee to the President of Yale recommended the development of molecular approaches to biology.

When Ripley left Yale to become the eighth Secretary of the Smithsonian Institution, Charles G. Sibley became the William Robertson Coe Professor of Ornithology and Curator at the Peabody Museum. With his student-then-colleague, Jon Ahlquist, Sibley re-evaluated bird classification first using egg-white proteins and then switching to DNA-DNA hybridization experiments in 1974. Their work transformed avian systematics.

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Despite Yale's emphasis on molecular methods in biology after 1964, other kinds of research produced excellent scholarship suggesting the need for a broader notion of what constitutes superior scholarship in biology and ornithology. The plan to create the Organismal and Evolutionary Biology Department indicates Yale's recognition of the plurality of approaches to the life sciences. Plans for a new building to house the ornithology collections at the Peabody Museum suggest a promising future for the valuable collections and future research in ornithology at Yale.

Ornithology at Yale University and the Peabody Museum provides a rich variety of themes for analysis. The central objective of this chapter is to show that different approaches to the study of birds at various levels of organization have produced superior scholarship at Yale. Avian paleontologists, avian systematists, bird collectors, molecular biologists, behavioral ecologists, and conservation biologists have each developed successful research programs that have made significant contributions to ornithology. At Yale, as elsewhere, the story of a discipline such as ornithology begins with an edifice.

ORIGINS OF THE PEABODY MUSEUM OF NATURAL HISTORY AND EARLY STUDIES

When the first wing of the Peabody Museum of Natural History was completed in 1876, it was a tangible representation of the vision of Benjamin Silliman, Jr. (1779-1864) and the philanthropy of George Peabody (1795-1869). Silliman had met with Peabody through Peabody's nephew, Othniel Charles Marsh (1832-1899) who had been Silliman's student at the Sheffield Scientific School (the original program in sciences at Yale from 1846 to 1856). Marsh had persuaded Peabody, an international financier, to endow a professorship for Marsh to fill. When Silliman met Peabody in 1857, he suggested the value of a "cabinet" to house growing collections in geology and natural history. With Marsh acting as an intermediary, Peabody agreed to provide Yale with $150,000 for the construction of a Museum of Natural History, especially departments of zoology, geology, and mineralogy. Curatorships were established in each of these areas. Marsh filled the position in geology while Silliman became curator of mineralogy. A naturalist named Addison Emery Verrill (1839-1926) was appointed curator of Zoology.

Verrill was the first professor of Zoology at Yale. As a student at Harvard, Verrill hoped to become an ornithologist and he oversaw the

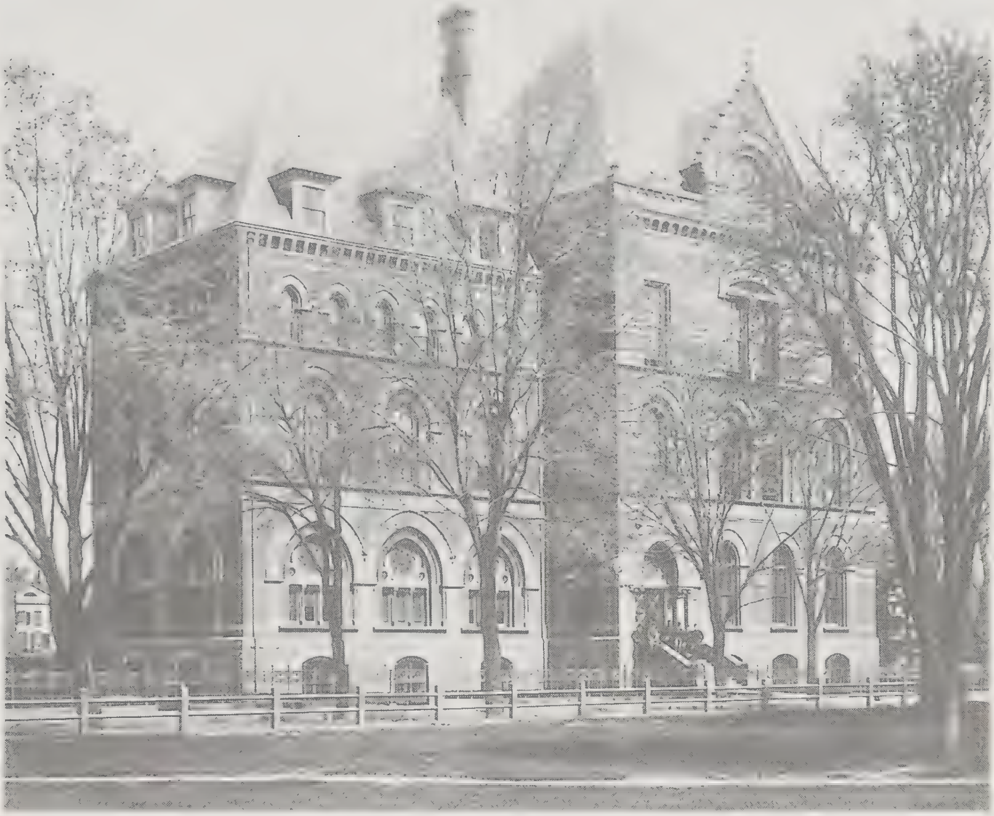

Fig. 1. The Peabody Museum of Natural History, the "Old Cabinet" ca. 1876. Courtesy of the Peabody Museum of Natural History, Yale University.

mammal and bird collections at the Museum of Comparative Zoology there (Barrow 1995). He completed his B.S. at Harvard in 1862 and joined the faculty at Yale two years later. Verrill managed all of the zoological collections in the original College cabinet, but his interests had shifted to marine invertebrates and the zoological collections at Yale reflected this shift. In 1867, Verrill was appointed Curator of Zoology, a position he held until 1910 (Remington 1977). He wrote more than 350 papers and described more than a thousand marine invertebrate species during the

Fig. 2. Addison Emery Verrill ca. 1893. Courtesy of the Peabody Museum of Natural History, Yale University.

course of his long tenure at Yale (Coe 1929). Throughout this period, the bird collection remained small, used mainly for teaching purposes.

Although Verrill did not emphasize birds as curator of Zoology, O. C. Marsh's wide-ranging interests in paleontology and geology included some of the earliest work in avian paleontology. After his appointment as Curator of Geology, Marsh planned several expeditions to the American west to collect paleontological specimens. The three Yale Scientific Expeditions included more than a dozen students or recent graduates of

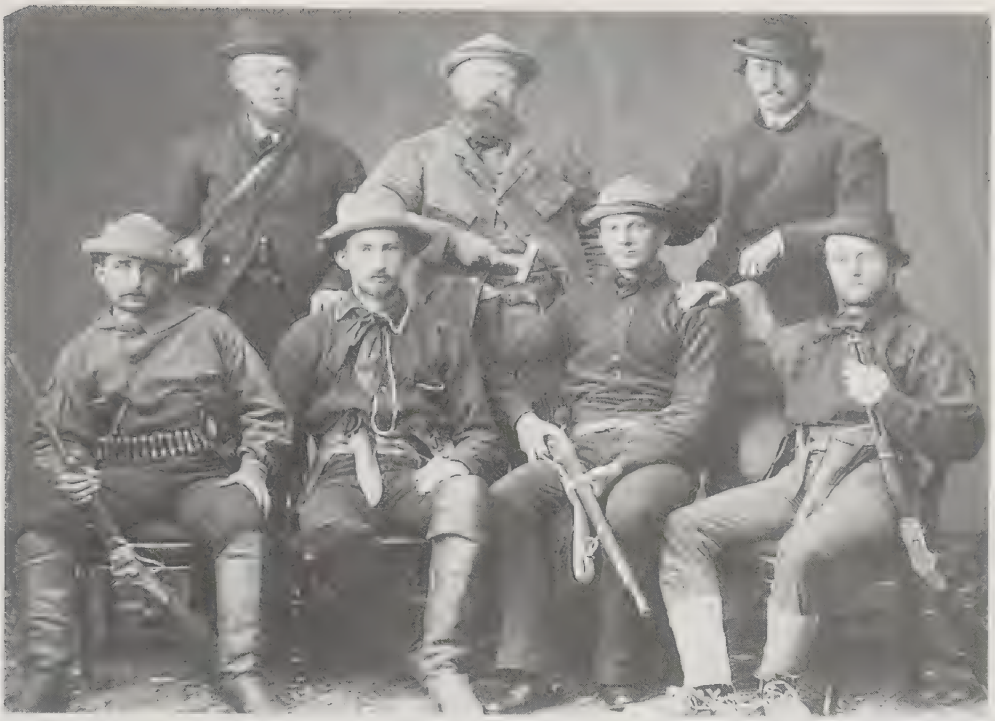

Fig. 3. Yale Scientific Expedition of 1872. O. C. March stands at the center. Courtesy of the Peabody Museum of Natural History, Yale University.

Yale College including George Bird Grinnell and Eli Whitney. William (Buffalo Bill) Cody served as an army scout on several of the expeditions. During the first expedition to western Kansas, in December 1870, Marsh's expedition faced extreme cold and "hostile Indians" (Marsh's description), which made the expedition particularly perilous. Marsh however managed to find part of a tibia bone of a species which he later described as belonging to the genus Hesperornis. In addition Marsh found several specimens of the genus Odontornithes (also described by Marsh, 1873). Two more

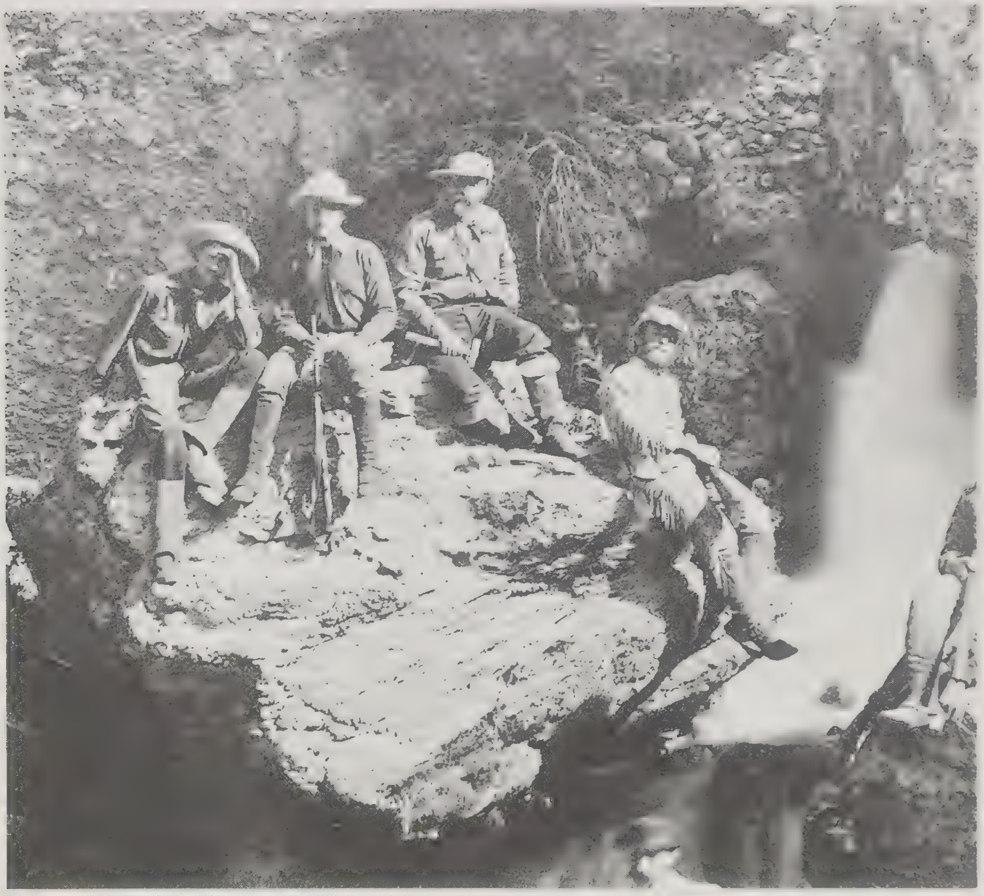

Fig. 4. Yale Scientific Expedition of 1871 near Salt Lake City, Utah. O. C. Marsh is seated third from the left. Courtesy of the Peabody Museum of Natural History, Yale University.

expeditions were led by Marsh and he supported several other expeditions to the region and obtained many more specimens (Marsh 1880, Schuchert and LeVene 1978).

In 1880, O. C. Marsh (1880) summarized his discoveries during the Yale Scientific Expeditions in Odontornithes: A Monograph on the Extinct Toothed Birds of North America which was published as part of the series on United States Geological Exploration of the Fortieth Parallel. After reviewing the anatomy of Hesperornis and Ichthyornis, Marsh noted that

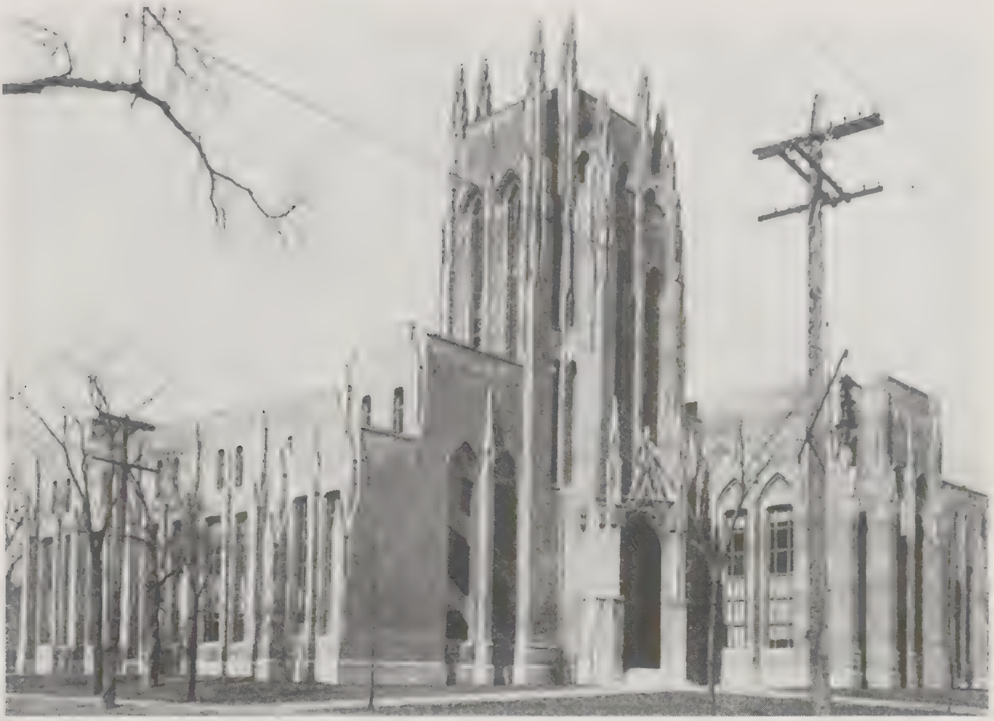

Fig. 5. The Peabody Museum of Natural History, The New Building, ca. 1925. Courtesy of the Peabody Museum of Natural History, Yale University.

the differences between the birds exemplified a fundamental principle of evolution that certain characters could become highly developed while others remained like the ancestral form. He then listed the ten characters that an ancestral bird would exhibit. Finally, Marsh concluded that Hesperornis, Ichthyornis, and Archaeopteryx proved beyond question "the marvelous diversity of the avian type in Mesozoic time; and also give promise of a rich reward to the explorer who successfully works out the life-history of allied forms, recorded in ages more remote" (Marsh, 1880).

Marsh's seminal work on the Odontornithes began a long tradition of research in avian paleontology at Yale and in the United States.

In 1917, demolition of the first Peabody Museum building brought the initial period in the history of ornithology at Yale to an abrupt conclusion. But the pioneering efforts of Silliman, Marsh, and Verrill, in addition to Peabody's philanthropy, had created a space at Yale for the study of natural history and the Peabody Museum of Natural History.

STANLEY C. BALL—YALE'S FIRST ORNITHOLOGIST

At the dedication ceremonies of the new Peabody Museum of Natural History on 29 December 1925, Charles Schuchert (eventual biographer of O. C. Marsh) described the rise of the original Peabody Museum and its collections and the demolition of the building in July 1917 to make way for a quadrangle, for undergraduate students, modeled after Oxford and Cambridge universities. Although it was predicted that in two years a new Peabody Museum could be built, investments declined by half during World War I and a building was not completed until 1925 (Schuchert 1926). A large brick cathedral-like structure, the Peabody Museum of Natural History prompted the president of Yale University to claim: "We hope and believe that all who appreciate the unlimited possibilities of this institution will, by their support, enable us to realize its fullest usefulness" (Angell 1926). While the new building provided evidence of a newly restored support for natural history at Yale, the appointment of Stanley C. Ball as Curator of Zoology indicated support for ornithology.

Stanley Crittendon Ball completed his bachelor's degree at Yale in 1911 and his doctorate four years later. After receiving his doctorate, Ball spent a year as the Assistant Curator of Zoology at the Peabody Museum, but a curatorial position opened at the Bishop Museum in Honolulu (with close ties to Yale), so Ball spent the next ten years developing his skills as both an ornithologist and a curator in Hawaii. His return to Yale coincided with the completion of the new Peabody Museum of Natural History. As curator of the new museum, Ball managed all of the zoological collections (like Verrill), but all of his published scholarship focused on birds.

Ball's published papers treated a variety of subjects including Pacific jungle fowl, hybrid ducks, and the birds of Quebec. Drawing from collections of the Whitney South Seas Expedition, Ball examined 92 jungle fowl (Gallus sp.) specimens from various locations in the Pacific islands. Ball probably began this study while curator of the Bishop Museum where seven of the jungle fowl specimens were stored. After an exhaustive

Fig. 6. Stanley Crittendon Ball examining American Robins (*Turdus migratorius*), 1939. Courtesy Yale University News Bureau.

description of each bird, including microscopic study of feathers, Ball concluded that the jungle fowl of the Pacific had most likely descended from birds introduced by Polynesian travelers rather than from domestic fowl reverting to a more primitive form (Ball 1933). Equally descriptive but local to New Haven was Ball's study of hybrid ducks which emphasized two intergeneric crosses between *Bucephala* and *Lophodytes*. This paper (Ball 1934) appeared in the third issue of *The Peabody Museum of Natural*

History Bulletin, which eventually became a very important publishing outlet for many Yale ornithologists.

In addition to these early publishing efforts, Ball fulfilled his obligations as a professor in the Department of Zoology and as curator of the collections of the Peabody Museum. As a professor, Ball taught Elementary Biology to freshmen, Natural History to extension students, and Ornithology to upperclassmen. In some years, Ornithology attracted a small but enthusiastic following and Ball reported to the director of the museum that interest on the part of students was sufficiently high to maintain excellent attendance on field trips that, after 1 April, began at 5:30 A.M. (Ball 1941). By and large, Ball's efforts to expand the bird collection were confined to procuring birds and eggs for the collection of North American birds. In this endeavor, Ball was assisted by R. C. Morrill who was the preparator for the museum collections. Morrill collected locally and managed to produce more than 100 skins during some years.

Ball also sought to buy and trade skins, and donations comprised a significant source of new skins for the collection. In his Annual Report of 1940, Ball included the following note: "The department has purchased skins of the Ivory-billed Woodpecker (*Campephilus principalis*) and Northwestern Wild Turkey (*Meleagris gallopavo*), both now becoming rare" (Ball 1940). A statement like this one suggests that Ball's experience was mostly limited to Connecticut (and the ten years in Hawaii), as the Ivory-billed Woodpecker stood on the brink of extinction in 1940 while Wild Turkey populations suffered from the pressures of overhunting. With fewer than 200 birds added to the collection annually, the museum collections grew slowly during Ball's curatorship. As space was a constant source of frustration and limitation for Ball, he seemed content with the gradual rate of expansion. Nevertheless, Ball enthusiastically received a collection of 195 mounted birds of the world from the American Museum of Natural History in 1943.

During the 1930s, Stanley Ball spent his summers conducting research on the Gaspé Peninsula in Quebec, Canada. Most of his published papers developed out of this research after 1935 (e.g., Ball 1938). Instead of the highly descriptive papers of his early career, Ball placed a greater emphasis on ecology, nesting, migration, and biogeography. For example, a paper on the European Starling (*Sturnus vulgaris*) (which Ball first recorded at Gaspé in 1935) noted that in 1937 American Crows (*Corvus brachyrhynchos*) kept the nascent starling population in check by preying on nestlings, but that the following year starlings chose holes less accessible to crows (Ball 1945). Another paper examined the migration of the Red-breasted Nuthatch (*Sitta canadensis*) through the Gaspé. Having noted large flights of nuthatches in August of successive years, Ball elimi-

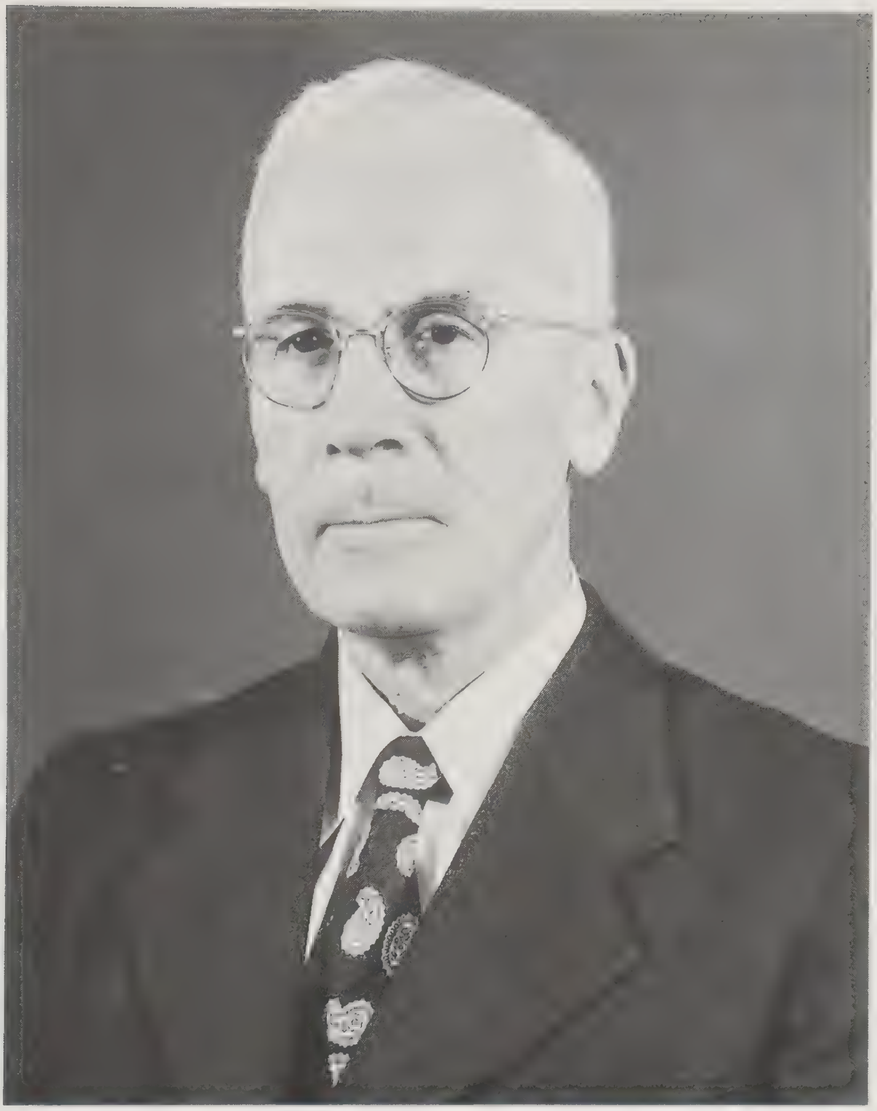

Fig. 7. Stanley Ball in 1949. Courtesy Yale University News Bureau.

nated a variety of factors including wind, photoperiod, the cone crop, and Snowy Owl (*Nyctea scandiaca*) irruptions, as causal elements in the migrations of nuthatches (Ball 1947).

In three additional papers on birds of Gaspé, Ball greatly expanded his analysis of bird migration (Ball 1952) and provided annotated species lists for the region (Ball 1954a,b). The species lists are particularly reflective of field ornithology during the early twentieth century as American ornithologists attempted to gather data on areas that had not been extensively explored by ornithologists. Although low on theoretical content, studies like these provided a solid basis for further research. Ball's migration studies (Ball 1947, 1950, 1952) also lacked a strong theoretical framework, but they represent attempts to engage processes in the biological sciences. By the middle of the twentieth century, biologists had achieved a certain unity centered around the evolutionary synthesis (Smocovitis 1996). Scientists like systematist Ernst Mayr, geneticist Theodosius Dobzhansky, and paleontologist George Gaylord Simpson had begun to see a complementarity in their disciplines that illuminated processes of evolution. Even at Yale, G. Evelyn Hutchinson was studying the processes of ecology. Ball's studies although valuable in raising the level of knowledge about the birds of North America, and raising important questions about migration, failed to shed the light of rigorous analysis on such processes and thus had fallen out of step with contemporary trends in biology. There was little in Ball's research that would engage systematists like Mayr or ecologists like Hutchinson. With a small collection and a slow rate of expansion, ornithology at Yale under Stanley Ball could hardly be seen as dynamic or progressive.

Ball's research, teaching, and management of the museum was severely limited during World War II. As the war drew to a close, Ball's annual reports indicated a persistent need both for space and qualified assistance. The appointment in 1946 of S. Dillon Ripley II, a young Yale graduate with a Harvard doctorate and extensive field experience in the Far East addressed some of that need. In his annual report to the Director, Ball (1946) marked the arrival of Ripley:

> "Dr. S. Dillon Ripley has joined the staff as ornithologist. His experience in field work, particularly in New Guinea, the East Indies, and other islands of the southwest Pacific, as well as his scholarly papers upon material taken on these expeditions, give every promise of continued efficient field work and research."

It seems odd that Ball, whose published work fell squarely in the realm of ornithology, identified the younger Ripley as "ornithologist." Perhaps Ball saw in Ripley the future of ornithology at Yale. In any case, the arrival of Ripley led to a shift in museum activities to matters that concerned Ripley such as expanding the collection, obtaining a stronger representation of birds of the world, and reporting on those collections in the ornithological literature.

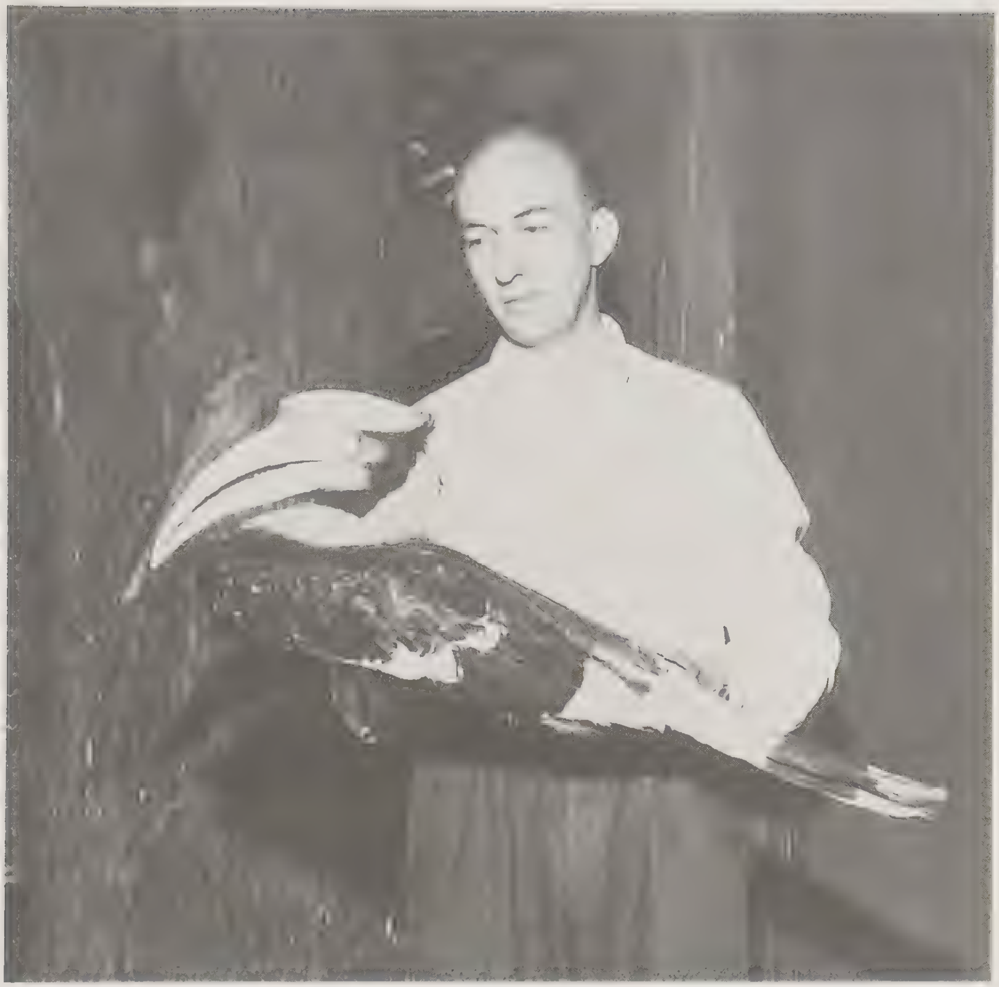

Fig. 8. S. Dillon Ripley II examining Hornbill ca. 1955 prior to expedition. Courtesy Manuscripts and Archives, Yale University.

S. DILLON RIPLEY AND EXPANSION OF THE COLLECTION AND RESEARCH AGENDA

Although he had been interested in birds since childhood, S(idney). Dillon Ripley II (1913-) pursued a degree in history at Yale (with thoughts of fulfilling familial expectations that he would attend law school). When he received his bachelor's degree, however, Ripley chose ornithology over law and enrolled in a graduate program at Columbia University. He soon found chemistry, genetics, histology, and anatomy to be far removed from his real interest. With the encouragement of Ernst Mayr, Ripley left Columbia to join an expedition to New Guinea as zoologist with a primary objective of collecting birds for the Academy of Natural Sciences of Philadelphia. The Denison-Crocket Expedition through the islands of the South Pacific and New Guinea lasted almost twenty months, during which Ripley collected more than 1300 birds. The Philadelphia Academy next sent Ripley on the George Vanderbilt Sumatran Expedition. After his return from his second expedition, Ripley entered graduate school at Harvard where he completed *Trail of the Money Bird* (1942), a popular narrative of his time in New Guinea and the South Pacific, and a dissertation titled "The Bird Fauna of the West Sumatra Islands" (1943). He also published papers on the Sumatran bird collections with Rudolph Meyer de Schauensee (Curator of Birds at the Philadelphia Academy) (Meyer de Schauensee and Ripley 1940) and on collections of the Whitney Expedition with Ernst Mayr at the American Museum (Mayr and Ripley 1941). Before he completed his doctorate, Ripley served the Smithsonian Institution as Assistant Curator of birds. During World War II, Ripley served as a bureau chief with the Office of Strategic Services in Ceylon, Burma, and India (a particularly fortuitous post as Ripley was able to expand his bird collections).

Remarkably, Ripley's productivity increased after his return to Yale. In his first year as Lecturer and Associate Curator, Ripley mounted a major expedition to India with support from the Smithsonian Institution. After his return to Yale in 1947, the National Geographic Society agreed to support an expedition to Nepal. Ripley spent the rest of 1947 and most of 1948 arranging for this second expedition, which was finally launched in November of 1948. Because he was visiting areas that had been closed to westerners, making arrangements for such expeditions required the utmost diplomacy. Even at the beginning of his career, Ripley demonstrated an innate sense for effective grantsmanship and scientific diplomacy. During these two expeditions, Ripley collected a vast number of specimens for the Peabody and the Smithsonian, wrote another travel narrative, *Search for the Spiny Babbler* (1952a), and published scores of papers about the collections. Moreover, he befriended Salim Ali, an Indian ornithologist, with whom he planned to prepare a major study of Indian birds.

In 1949, Dillon Ripley was promoted from Lecturer to Assistant Professor of Zoology at Yale. A review of his publications during his first years at Yale may provide insights into Ripley's interests, the practice of American ornithology abroad, and Yale's place in American ornithology. After his return from Nepal, Ripley prepared numerous papers about the birds he had collected with titles like "The Birds of the Mishmi Hills" (Ali and Ripley 1948) and "New Birds from Nepal and the Indian Region" (Ripley 1950). Such papers provide brief location and abundance notes regarding undescribed species and subspecies. Ripley published many of these papers in in-house publications such as the *Journal of the Bombay Natural History Society* (with which Ripley had been an affiliate since his first expedition to India) and *Postilla* (a publication created by Ripley at the Peabody Museum of Natural History for ornithological papers).

Ripley's choice of journals and his choice of paper topics provide revealing clues to his approach to science. In-house publications like *Postilla* enabled an ornithologist to expediently communicate discoveries of new birds or taxonomic revisions to other scientists by circumventing the lengthy process of peer-review. In addition, publications could be traded for other similar publications of other museums and universities (thereby avoiding subscription expenses).

The papers that described Ripley's collections were valuable on several levels. First, they alerted ornithologists to new collections at the Smithsonian and the Peabody Museum. Second, they expanded ornithologists' knowledge of the birds of the world. Finally, such papers facilitated further theoretical study of biological processes such as biogeography and evolution. To a certain degree, Ripley attempted to frame some of his work in light of biological processes as suggested by a paper that appeared in the journal *Evolution* entitled "Avian relicts and double invasions in peninsular India and Ceylon." Arguing that geographic and physiographic features had the potential to create ecological islands in southern India and Ceylon, Ripley enumerated several examples of avian relicts and double invasions from these regions (Ripley 1949). In papers like this, Ripley attempted to engage other theoretical biologists and ornithologists.

A final type of publication produced by Ripley during his early years at Yale was the taxonomic review of a bird family as exemplified by a revision of the thrush family (Turdidae) (Ripley 1952b). This kind of review held significance mainly for other ornithologists. It served as a reference for anyone studying thrushes and anyone pursuing avian systematics. Later, Ripley (1964) expanded his analysis of the thrushes for volume 10 of the monumental taxonomy of birds, *Birds of the World* prepared at the Museum of Comparative Zoology at Harvard.

It is clear that from the beginning of his career, Ripley was not satisfied by communicating to a narrow audience of like-minded scientists—he wished to speak to the broadest audience possible. His travel narratives brought the natural history of distant lands to the American public. In this respect Ripley followed closely in the footsteps of one of his professors at Harvard, Thomas Barbour of Harvard's Museum of Comparative Zoology, who wrote four books about his travels.

Ripley received a promotion to Curator in 1952. Certainly by this time (and probably much earlier), he had assumed full responsibility for the bird collection. With his considerable efforts in collecting, the number of bird specimens was rising at an exponential rate. By 1948, Ripley was joined by Raymond A. Paynter, Jr. (1925-), a graduate student. Like Ripley, Paynter strove to expand the ornithological knowledge base by collecting and studying birds in the less explored regions of the world. Paynter's graduate research focused on the birds of the Yucatán Peninsula in Mexico. Three expeditions (amounting to more than twelve months) enabled Paynter to contribute nearly 1900 specimens from the Yucatán to the Peabody Museum. More than a thousand additional specimens for the museum were contributed by D. Brainerd Legters (an American living in Mexico) and Andrés Baeza (a local collector in Quintana Roo). Paynter published several notes on the collection (Paynter 1950a,b; 1954, 1955a, and 1956). In 1953, he accepted a position as Assistant Curator of the Bird Department at the Harvard MCZ where he completed his dissertation the following year (See Appendix I). Paynter's association with Yale and the Peabody Museum was not terminated immediately because he published his dissertation in the *Peabody Museum Bulletin* (Paynter 1955b) and organized the Harvard-Yale Expedition to Pakistan in 1957 (Paynter 1962).

Another student, George E. Watson III, began studying birds with Ripley during the mid-1950s. Watson completed several papers related to the collections, including notes on a collection he made in Cuba (Ripley and Watson 1956), and descriptions of subspecies from the Aegean Sea (Watson 1961) and the Cape Verde Islands (Ripley and Watson 1963). In 1964, he completed his doctoral dissertation about birds of the Aegean (Watson 1964).

In 1957, after Ripley was promoted to Curator and Ball had retired, Philip Strong Humphrey joined the department as Assistant Curator. With a doctorate from the University of Michigan supervised by Josselyn Van Tyne, Humphrey worked closely with the collections and graduate students, many of whom expressed gratitude to Humphrey for suggesting dissertation topics. Like other members of the ornithology department, Humphrey published several papers in *Postilla* on various subjects including the affinities of the Pink-headed Duck (*Rhodonessa caryophyllacea*) (Humphrey and Ripley 1962) and notes on a collection made by Rudolf Freund and his wife for the Peabody Museum (Humphrey and Freund 1962). Humphrey left Yale in 1962, but he maintained an affiliation as a research associate in ornithology until 1966. Both Humphrey and Watson joined S. Dillon Ripley at the Smithsonian after Yale. In 1967, Humphrey became director and ornithologist for the University of Kansas Museum of Natural History.

The 1950s were a dynamic time in ornithology at Yale and the Peabody Museum. The collection had grown dramatically while faculty and students were producing numerous publications. The vitality of the department can certainly be attributed to the efforts of S. Dillon Ripley II. Ripley was also an excellent administrator particularly in raising funds for continued development and research. William Robertson Coe was the primary benefactor during this period and he made major donations for the ornithology library, a new building for the collections, and an endowed professorship in ornithology. At a university as steeped in tradition as Yale, buildings provide an index of the commitments of the university. As new buildings indicated Yale's support of natural history and the life sciences during the careers of Marsh and Ball, a new building for the ornithological collections during Ripley's tenure suggested Yale's backing of his work at the museum.

The Oceanographic and Ornithological Laboratories ("O & O Lab") at the Peabody Museum of Natural History, Yale University were dedicated on 30 October 1959, significantly timed to commemorate the centennial of the publication of Charles Darwin's *On the Origin of Species* (1859). Ripley, who had recently accepted the directorship of the museum, commented on the value of collections at the dedication ceremony: "We cannot exist without our museum. The use and utility of its collections are validated time and again and will continue to be so long as our culture survives" (Ripley et al. 1960). The entire third floor of the new building was dedicated to the ever-expanding collection of bird specimens, including skins, skeletons, and "pickles" (specimens preserved in alcohol). In the 13 years since Ripley's arrival at Yale, the bird collections had increased to 100,000 specimens from fewer than 10,000 in 1946. The architects had replaced windows on the third floor with skylights to maximize indirect illumination without direct sunlight and increase the amount of available work space. The "O & O Lab" meant state-of-the-art facilities for an important and significant collection of birds.

Having assumed the responsibilities of the director of the Peabody Museum, one would expect Ripley's productivity in ornithology to suffer. Yet, during the early 1960s, he continued to publish papers about collections of birds from India, the Philippines, and Africa. Work also progressed on the *Handbook of Indian Birds* that he was writing with Salim Ali (Ali and Ripley 1968-1974). Ripley continued to present science to the public both through the auspices of the museum and with a book called *The Land and Wildlife of Tropical Asia* which was published in the Time Life book series (Ripley et al. 1964). In 1961, Ripley was promoted to Professor of Biology. From outward appearances, Ripley and ornithology could anticipate a bright future at Yale.

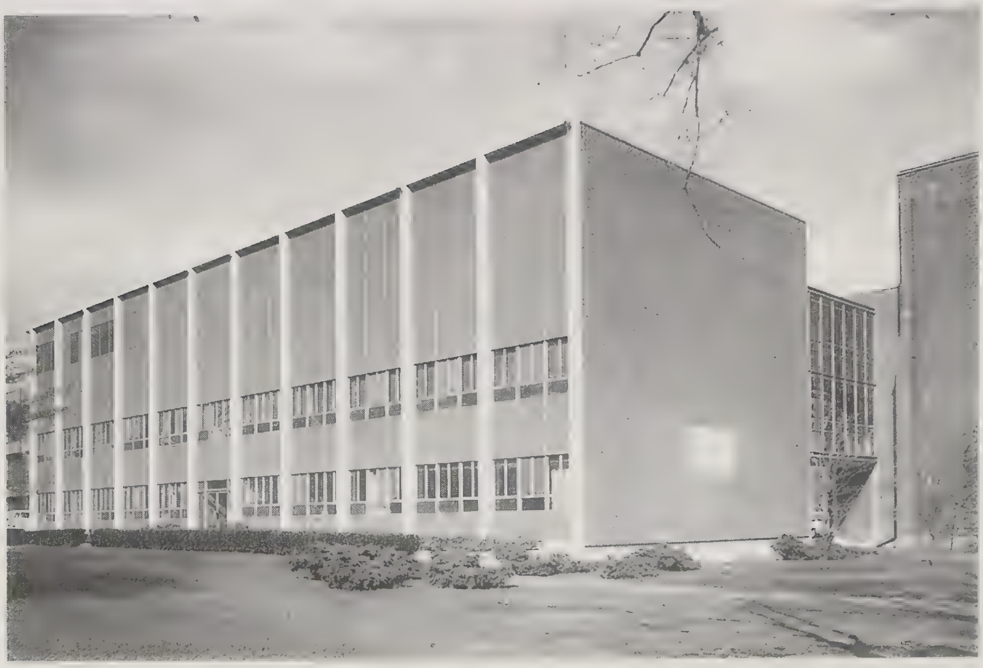

Fig. 9. The Oceanographic and Ornithological Laboratories ("Bingham Laboratory") ca. 1960 after dedication on 30 October 1959. Courtesy of the Peabody Museum of Natural History, Yale University.

In May of 1959, when the O & O Laboratories were being prepared for dedication, biology and the sciences in general at Yale were coming under the close scrutiny of the university administration. On 21 May 1959, A. Whitney Griswold, President of Yale, formed a small science advisory committee which would review the structure of Yale science and assist the president in preparing recommendations to the Yale Corporation for "consolidating and strengthening its position in the University" (Fruton 1994).

During sixteen meetings over the ensuing six months, the committee evaluated the sciences at Yale. Some of the science review committee's harshest criticisms were directed at the Department of Zoology: "The Department of Zoology, in spite of its numerical strength, has real distinction only in ecology, as represented by Hutchinson, Brooks, Deevey, and Riley, and of those only Hutchinson can be rated as outstanding" (quoted in Fruton 1994). The committee also suggested "the fusion of the departments of zoology and botany into a single department of biology under the chairmanship of a new professor distinguished in one of the currently important areas of *experimental* biology" (Fruton 1994, emphasis added). Resistance to this plan from members of both botany and zoology lasted until 1964, but the university decision to build Kline Biology Tower with funds from a 10-million-dollar grant from Mahlon Kline and to appoint Clement Markert (a geneticist and embryologist from Johns Hopkins University) as head of the Biology Department clearly indicate that the Yale Corporation accepted the above recommendations.

S. Dillon Ripley II never received the William Robertson Coe Chair in Ornithology, which had been endowed in Ripley's honor. Whether or not Ripley would have received this honor became a moot and rather trivial point when he was appointed Secretary of the Smithsonian Institution in 1964, only the eighth scientist to attain this position. At the Smithsonian, Ripley continued many of the innovative programs he had developed at the Peabody Museum. He also continued his work as an ornithologist by completing the 10-volume *Handbook of the Birds of India* (Ali and Ripley 1968-1974) and a major monograph about the rails of the world (Ripley 1977) as well as adding significantly to his list of shorter publications. Space considerations prohibit the enumeration of Ripley's administrative successes at the Smithsonian. Suffice it to say that the institution achieved much of its present diversity and grandeur during the two decades Ripley stood at its helm. Yale's loss was the Smithsonian's gain.

Ripley referred to himself as "An old-fashioned naturalist of the Darwin school" (Moritz 1966). Even a brief review of Ripley's published works demonstrates the accuracy of the statement. There is no question that Ripley's publications greatly contributed to ornithologists' knowledge of birds of the world (particularly in India, Asia, and Africa). In addition, Ripley summarized and expanded what was known of several bird families especially the thrushes, babblers, and rails. For biologists interested in taxonomy or conservation, Ripley's work has considerable value. Nevertheless, Yale restructured its programs in the life sciences during the 1960s. Like many other American universities, Yale became convinced that experimental molecular and cellular biology represented "true science" with the expectation that superior scholarship in the life sciences would be

Fig. 10. S. Dillon Ripley. Courtesy of Charles Erickson, Office of Public Information, Yale University, and the Peabody Museum of Natural History, Yale University.

produced in these fields. Despite his many achievements as Director of the Peabody Museum and Curator of Ornithology, Ripley's "old school natural history" did not conform to Yale's definition of the biological sciences. Beginning in 1960, biology at Yale increasingly meant molecular biology. The arrival of Charles G. Sibley in 1965 brought this level of analysis to ornithology.

SIBLEY AND AHLQUIST AND MOLECULAR APPROACHES IN AVIAN SYSTEMATICS

Charles G. Sibley (1917-1998) had spent a dozen years as Associate Professor, then Professor, at Cornell before he arrived at Yale in 1965 to become Professor of Biology and the William Robertson Coe Professor of Ornithology. Only one year into Sibley's tenure at Yale, the university confirmed its commitment to the pursuit of molecular biology by dedicating Kline Biology Tower, an enormous red-brick modernist structure of 12 stories, near the end of 1966. Although Sibley had a small office in Kline, he spent most of his time in his office near the bird collection in the O & O Laboratory. In many respects, his previous research was perfectly suited to Yale's vision of the future of biology.

After earning his doctorate in zoology at Berkeley in 1948, Sibley taught briefly at the University of Kansas and San Jose State College in California. In 1953, he moved to Cornell where he was an associate professor in ornithology and curator of birds. Charles Sibley transformed the study of ornithology at Cornell by emphasizing avian classification. In a course titled "Advanced Systematic Ornithology," students spent three intensive weeks dissecting domestic fowl and studying the anatomy of birds. With a firm basis in the anatomical characters of classification, students applied this knowledge to the study of specimens representing the Orders and Families of birds of the world. Sibley wrote as a study guide, *A Synopsis of the Birds of the World: A Manual of Systematic Ornithology* (Sibley 1955). This title was also a key to Sibley's interest in ornithology.

While at Cornell, Sibley and his students examined avian subspecies. Using the American Ornithologists' Union's (AOU) *Check-list of Birds of North America* (AOU 1931, 1957) and detailed maps, Sibley identified places for which subspecies had not been described. It was to these places that he and students would go to collect birds and with some regularity describe overlooked subspecies (F. C. Sibley pers. comm.)

In addition, Sibley looked to molecular biology for a robust taxonomic character. At Cornell it appeared that egg-white proteins would serve as the character Sibley sought. In 1960, he published preliminary findings on the study of 359 non-passerine birds (Sibley 1960). His paper demonstrated that protein structure is phylogenetically conservative and thus informative concerning higher taxonomic categories. Recognizing the number of gaps in his analysis, Sibley went on to discuss his findings regarding several bird Orders, Families, and genera, and requested ornithologists to send additional material for future analysis. When Charles Sibley joined the Yale faculty in 1965, it was the egg-white research that he hoped to complete.

Fig. 11. Charles Gall Sibley ca. 1965. Courtesy of the Peabody Museum of Natural History, Yale University.

A year after Sibley started at Yale he was joined by one of his Cornell undergraduates who had participated in the protein research. Jon Edward Ahlquist (1944-) began his graduate studies as a National Defense Education Act predoctoral fellow in the Department of Biology. From the outset of his time at Yale, Ahlquist was closely involved in Sibley's studies of egg-white proteins.

In *A Comparative Study of the Egg-White Proteins of Passerine Birds* (Sibley 1970), Sibley simultaneously acknowledged the limitations of electrophoretic data from egg-white proteins and argued for the value of such data. This argument stemmed in part from Sibley's thorough historical review of the taxonomic literature regarding each group included in the study (the historical review would become a signature of Sibley's publications). Rather than providing "conclusions" that would overstate the strength of any taxonomic characters, Sibley enumerated "statements" which he ranked in four groups of probability (highly probable, probable, possible, and improbable). One of the most interesting of the "highly probable" statements (also noted by Sibley two years earlier) suggested that *Zeledonia* (a Central American genus) is more closely related to the wood warblers, than to the thrushes (Sibley 1968, 1970).

In the next major publication to emerge from the egg-white data (Sibley and Ahlquist 1972), *A Comparative Study of the Egg White Proteins of Non-Passerine Birds*, Jon Ahlquist appeared as co-author. This monograph greatly expanded Sibley's preliminary 1960 *Ibis* paper. As in the passerine monograph, the authors drew conclusions from the study in the form of statements under four categories of probability. In the category of "highly probable," Sibley and Ahlquist suggested that the large ratites are monophyletic and evolved from a flying ancestor. In an Epilogue, the authors noted the limitations of the starch-gel technique for analyzing egg-white proteins, and described the possible course of their future research (using new methods and/or blood proteins). The final sentence of the paper (Sibley and Ahlquist 1972) reasserted the value of molecular biology to avian systematics:

> "Such material is taking its place in collections along with traditional specimen material and we predict that biochemical equipment will be as indispensable to the next generation of systematists as the calipers and scalpel have been in the past."

This statement contains a fundamental aspect of Sibley and Ahlquist's research agenda. Although they were using molecular techniques, they were attempting to answer basic questions in avian systematics. Such taxonomic questions linked them to what Ripley had called "old-school naturalists." Moreover, the material (egg-whites or blood samples) they subjected to molecular analysis had to be collected just as Ripley and old school naturalists collected birds. Sibley and Ahlquist developed an extensive network of contacts throughout the world to supply them with raw material for analysis. During the 15 years of the egg-white studies, more than 350 people contributed to the collection of material.

Egg collecting brought Charles Sibley into conflict with the U.S. Fish and Wildlife Service in 1972 when one of his English collectors was investigated by the Royal Society for the Protection of Birds and fined. At issue was the egg of a Peregrine Falcon (*Falco peregrinus*) sent to Sibley by the collector. After an investigation that lasted more than a year, Sibley was fined under the Lacey Act which prohibits importing any part of an animal that is protected in its country of origin. For much of the twentieth century, ornithologists have negotiated with conservation groups and agencies for limited collecting rights for scientific studies. [See Barrow (1998) for a detailed analysis of the historical origins of this conflict.]

Collection was so important to their research agenda that Sibley employed a full-time collector in 1970. Fred C. Sibley (1933-) (no relation to Charles G. Sibley) studied ornithology with Sibley at Cornell as an undergraduate and later as a graduate student. While at Cornell, Fred Sibley completed a study of hybridization of red-eyed towhees (*Pipilo* spp.) in Mexico (Sibley and Sibley 1964). After completing his master's degree under Charles Sibley, Fred Sibley became a dedicated field biologist spending more than two years in Africa and three years working on the California Condor (*Gymnogyps californicus*) project. Fred Sibley joined Charles Sibley's team at the Peabody Museum to serve as a dedicated collector of birds, particularly species that did not occur in North America. During Fred Sibley's tenure at Yale, the collection emphasis shifted from study skins to skeletons and wet preserves (specimens in alcohol). These collections had been started by Philip Humphrey and Peter Ames under Ripley's supervision. More than 5000 skeletons of 1900 species augmented the collection in the years following Fred Sibley's arrival. Similarly, the collection of wet preserves rose to approximately 13,000 specimens of 2460 species.

Jon Ahlquist received his doctorate at Yale in 1974 (see Appendix I). He continued to work with Charles Sibley at Yale as a Research Associate in Ornithology at the Peabody Museum, a position he had held since 1972. In an article about his research, Ahlquist (1974) noted the promise of studies involving DNA hybridization:

> "Perhaps the definitive answer to this problem will be gained from studies involving DNA hybridization. In this technique the entire genetic complement of an organism can be compared to that of another . . . As this technique is applied to avian systematics, we can look forward to real solutions to the problems which for two centuries have confounded students of avian evolution."

Sibley and Ahlquist devoted much of their remaining 12 years at Yale employing the technique of DNA-DNA hybridization in avian systematics.

Sibley started investigating methods of comparing avian DNA while at Cornell, but continued to pursue his research with egg-white proteins until the completion of the two major monographs discussed above. In October of 1973, however, he learned that Gerald F. Shields (Shields and Straus 1975) had published the results from his doctoral dissertation using hydroxyapatite (HAP) thermal chromatography technique for a study involving several passerines (Sibley and Ahlquist 1990). Recognizing the promise of this technique, Sibley and Ahlquist abandoned their research with proteins. They managed to produce their first HAP DNA-DNA hybrids on 30 January 1975. This work continued virtually uninterrupted for nearly 12 years until 23 July 1986 during which Sibley and Ahlquist produced 30,054 DNA hybrids in 1209 experimental sets. To generate such a vast number of DNA-DNA hybrids, they constructed a semi-automatic instrument to perform thermal chromatography on up to 25 hybrids simultaneously. Of the hybrids produced, 26,554 were of birds representing 1700 species and all but three of the families of the birds recognized by Wetmore (Sibley and Ahlquist 1990). Out of this vast quantity of data, Sibley, Ahlquist, and others, including graduate students and field and lab assistants, produced nearly 40 papers on various groups of birds for peer-reviewed journals of ornithology and biology. The massive *Phylogeny and Classification of Birds: A Study in Molecular Evolution*, continuing for nearly 1000 pages, represents the culmination of their DNA-DNA hybrid research. In addition, Sibley wrote an equally massive companion volume with Burt L. Monroe titled *Distribution and Taxonomy of the Birds of the World*. These were published simultaneously (Sibley and Ahlquist 1990, Sibley and Monroe 1990). Two years earlier, the three ornithologists had foreshadowed their conclusions with a lengthy paper (Sibley et al. 1988).

When *Phylogeny and Classification* was reviewed, it was clear that the careers of Sibley and Ahlquist at Yale were being reviewed as well. (For a range of views, see Blem 1991, Diamond 1991, Gill and Sheldon 1991, Krajewski 1991, O'Hara 1991, Raikow 1991, Cracraft 1992, DeBeneditis 1992, and Houde 1992). The two ornithologists had spent close to a dozen years at Yale completing the experiments that served as the basis for this book. Another sense develops from a close reading of these reviews: ornithologists had divided into supporters and critics of Sibley and Ahlquist long before reading *Phylogeny and Classification*. Many reviews cited assessments of the work of Sibley and Ahlquist (and their responses) that dated back to 1985. The appearance of *Phylogeny and Classification* in 1990 seemed rather like the arrival of a major exhibit at a trial after the case had gone to the jury for deliberation. Even if the exhibit was important, the case would be decided without it. Thus, even though the reviews ranged from laudatory to damning, many of the reviews restated previous arguments for praising or condemning Sibley and Ahlquist for their methodology and/or conclusions. Another level on which *Phylogeny and Classification* was both acclaimed and attacked was Sibley and Ahlquist's attempt to synthesize avian systematics. Grand syntheses are fraught with challenges and risks, particularly in molecular biology where methods and statistics undergo constant modification and re-evaluation. What is the protocol, in a field where scholarship is driven by journal articles, for accommodating methodological change in a major monograph? Grand syntheses like *Phylogeny and Classification* provoke strong responses both negative and positive. To the extent that such controversy produces serious scholarship, syntheses serve science. In the Preface to *Phylogeny and Classification*, Sibley and Ahlquist (1990) expressed a similar belief:

> "Others will judge how successful we have been in achieving those goals; we think we made some discoveries and produced new evidence of avian evolution. Our data are not perfect and we did not subject them to every available statistical analysis; that we should have done many things better is undeniable, but hindsight is always crystal-clear. We urge critics to set up their own laboratories, collect the necessary specimens, and improve on our work. We did what we could with the methods and resources available."

Whether or not the Sibley and Ahlquist phylogeny and classification of birds of the world becomes generally accepted by ornithologists and avian systematists, deflects attention from the major impact their methods and conclusions have made in ornithology.

Charles Sibley and Jon Ahlquist left Yale in 1986 before the publication of *Phylogeny and Classification*. Sibley became Professor Emeritus at Yale and Dean's Professor of Science and Professor of Biology at San Francisco State University, while Ahlquist became Associate Professor of Zoology and Molecular Evolution at Ohio University in Athens, Ohio. While at Yale, these two scientists led a dynamic research program in molecular avian systematics, but the strength of the program at Yale was closely linked to its leaders. For more than 20 years after the Yale Corporation accepted the recommendations of its review committee in 1964, ornithology at Yale emphasized molecular analysis. Nevertheless, the departure of Sibley and Ahlquist signaled a change from the primarily molecular approaches to ornithology at Yale. To fully assess the meaning of this change, it is necessary to sharpen our image of ornithology at Yale between 1966 and 1990.

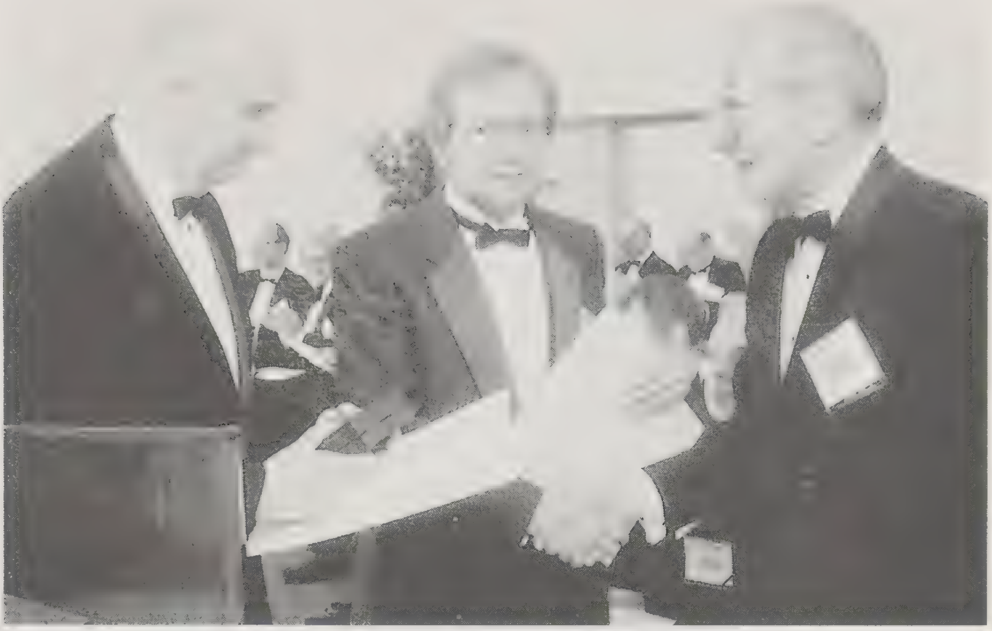

Fig. 12. Charles Sibley (left) and Jon Ahlquist (center) accepting the Daniel M. Girard Medal for Phylogeny and Classification from Frank Press (right), the President of the National Academy of Sciences. Washington, D. C. 25 April 1988. Courtesy of Jon Ahlquist.

ADDITIONAL ORNITHOLOGICAL RESEARCHERS AT YALE IN THE RECENT PAST

During the 20-year period they worked at Yale, Sibley and Ahlquist's research was central to ornithology at the university, but there were other scientists studying birds during this time period.

N. Philip Ashmole.—N(elson) Philip Ashmole, for example, served as Assistant Curator of Ornithology in the Peabody Museum of Natural History from 1964 to 1969 and as Associate Curator of Ornithology from 1969 to 1972. Having completed a doctorate at Oxford in 1961, Ashmole followed in the footsteps of Stanley Ball by pursuing a Yale-Bishop Museum Fellowship in Honolulu. Ashmole's research at the Bishop Museum focused on the breeding ecology of seabirds on Christmas Island, specifically Sooty (*Sterna fuscata*) (Ashmole 1963a,b) and White terns (*Gygis alba*) (Ashmole 1968). In several papers Ashmole examined extinct island avifaunas (Ashmole 1963c,d).

John H. Ostrom.—Another scientist renewed the association between Yale and avian paleontology established by O. C. Marsh. John H. Ostrom (1928-) became Assistant Professor of Geology and Assistant Curator of Vertebrate Paleontology in the Peabody Museum in 1961, one year after completing his doctorate in vertebrate paleontology under the supervision of George Gaylord Simpson (himself a Yale graduate). *Archaeopteryx* and the origin of bird flight has been one of Ostrom's chief research subjects during his long tenure at Yale. In 1970, he announced a "new" specimen of *Archaeopteryx* in *Science* (Ostrom 1970, 1972) and he later championed the "cursorial theory" for the origin of flight in *Archaeopteryx* (Ostrom 1970, 1974). His numerous papers on the origin of birds and the origin of avian flight have shed considerable light on this perpetual question in ornithology (See Ostrom (1997) for an overview). Ostrom, now a Professor Emeritus of Geology, continues to conduct research at Yale.

Jacques A. Gauthier.—The continued tradition in avian paleontology has been assured by the appointment of Jacques A. Gauthier (1948-) as Professor of Geology and Geophysics. After completing his doctorate in paleontology at the University of California, Berkeley, Gauthier spent three years as a National Science Foundation Postdoctoral Associate at the University of Michigan under Arnold Kluge and nine years at the California Academy of Sciences. As a cladist and paleontologist, Gauthier brings new insights to the study of the origin of birds and the evolution of avian flight (See Gauthier and Padian 1985, 1989, Gauthier 1986, and Houck et al. 1990). Jacques Gauthier became Professor in Geology and Geophysics at Yale and Acting Curator of Ornithology at the Peabody Museum in 1996. In February 1999, Gauthier hosted an international symposium honoring John Ostrom and celebrating the temporary exhibition of Chinese bird fossils.

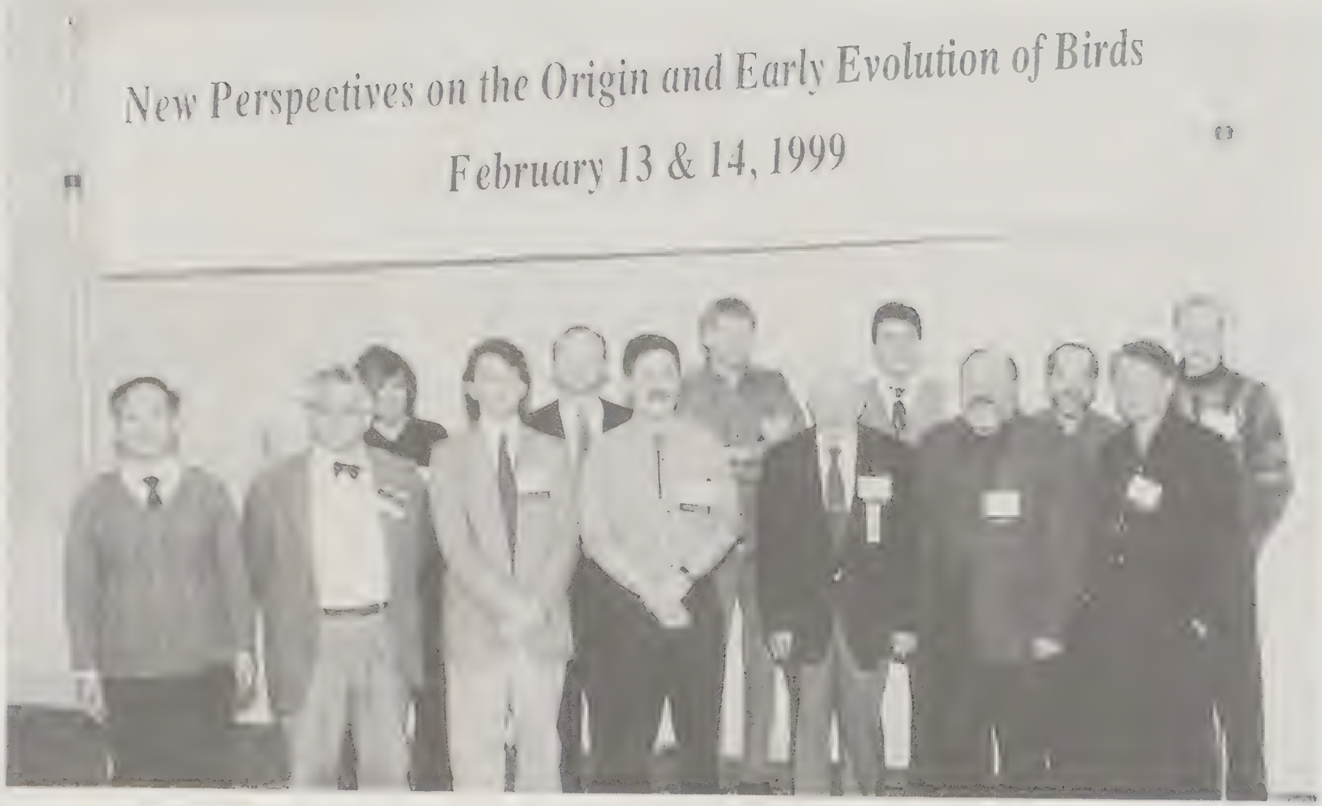
New Perspectives on the Origin and Early Evolution of Birds
February 13 & 14, 1999

Fig. 13. *New Perspectives on the Origin and Evolution of Birds*, an international symposium in honor of John H. Ostrom, Peabody Museum of Natural History, Yale University, 13 February 1999. Front row (left to right): Ji Quiang, Jeremy M. V. Rayner, Thomas R. Holtz, Jacques A. Gauthier, John H. Ostrom, Lawrence D. Martin, and Joel L. Cracraft; Rear row (left to Right) Mark A. Norell, Hans-Dieter Sues, Philip J. Currie, Paul C. Sereno, Gregory S. Paul, and Alan Gishlick. Courtesy William Sacco and the Peabody Museum of Natural History, Yale University).

Charles Robert Brown.—Another ornithologist joined the Yale faculty in 1985. Charles Robert Brown (1958-) completed his doctorate at Princeton under the supervision of John L. Hoogland. A behavioral ecologist, Brown studied coloniality in the Cliff Swallow (*Hirundo pyrrhonota*). His many papers explore the effect of group size on social behavior while addressing issues of brood parasitism and ectoparasitism. In 1986, Brown became Curator of Ornithology at the Peabody Museum and in 1989 he was promoted to Associate Professor of Biology. In 1993, he left Yale for the University of Tulsa (Oklahoma) having completed much of the work on a major monograph, *Coloniality in the Cliff Swallow*, coauthored with his wife and research associate Mary Bomberger Brown (Brown and Brown 1996).

Steven R. Beissinger.—Yet another ornithologist at Yale in the recent past studied avian conservation biology in Snail Kites (*Rostrhamus sociabilis*) and neotropical parrots. With a doctorate in Natural Resource Ecology from the University of Michigan, Steven R. Beissinger (1953-) joined the faculty of the Yale School of Forestry and Environmental Studies in 1988. At Yale, Beissinger continued his doctoral research on the mating behavior and conservation of the Snail Kite (Takekawa and Beissinger 1989, Beissinger 1990a,b). His research interests also included the reproductive ecology and conservation biology of parrots (Beissinger and Snyder 1991), particularly the Green-rumped Parrotlet (*Forpus passerinus*) in Venezuela (Beissinger and Waltman 1991, Stoleson and Beissinger 1997). He spent 1994 to 1996 as Associate Curator of Ornithology at the Peabody Museum. In 1996, Beissinger accepted a position at the University of California, Berkeley.

In addition to faculty with research interests in avian biology, Yale continued to attract graduate students who were interested in ornithology, many of whom have subsequently made important contributions in avian biology (see Appendix I).

THE PAST, PRESENT, AND FUTURE OF ORNITHOLOGY AT YALE

In the three decades since the departure of S. Dillon Ripley and the commitment of the Yale Corporation to emphasize scholarship in molecular biology, ornithology has taken many forms. Certainly Charles Sibley (to date the only person to have held the William Robertson Coe Chair in Ornithology) and his research associate Jon Ahlquist demonstrated the power of molecular analysis in avian systematics. Their achievements at Yale have yet to be fully acknowledged in the scientific community. There is also evidence of excellent ornithological scholarship in the areas of behavioral ecology, avian paleontology, and conservation biology. What constitutes superior scholarship in biology transcended the recommendations of the Yale President's science advisory committee of the 1960s. During the same period that molecular approaches to ornithology produced profound results, research at higher levels of organization (at the level of species or populations) has made valuable contributions to our knowledge of birds and their biology. The history of ornithology at Yale has demonstrated that the quest for the highest levels of scholarly research cannot be restricted to particular fields or methodological approaches. The Yale Corporation has recently acknowledged this notion by announcing the creation of a new department of Organismal and Evolutionary Biology to open in 1998. The next William Robertson Coe Professor of Ornithology may focus on molecular methods or principles of behavioral ecology and conservation biology or some combination of these disciplines and methods.

Undergraduates at Yale still turn out in good numbers for "Biology of Birds," an advanced biology course. For several years, Jon Moore, a Yale-trained ichthyologist, taught this course. Under Moore, "Biology of Birds" emphasized basic biology as it applied to birds, and labs for the course drew heavily on the collections at the Peabody Museum.

The Ornithology Collections in the Ornithology and Oceanographic Laboratory continue to serve as the center for ornithology at Yale. Currently, Jacques Gauthier serves as Acting Curator of Ornithology until a new curator is appointed. In the meantime, Fred Sibley manages the collections which have undergone considerable transformation. After years of overcrowding, the specimens were spread out on the trays and polystyrene tray liners replaced brown paper. Finally, Fred Sibley, now retired, supervised the reorganization of the collection to conform to the Sibley, Ahlquist, and Monroe classification of birds of the world. With 100,000 specimens, Yale has the largest collection organized according to this classification in the world. For more than ten years, directors of the Peabody Museum considered proposals for the construction of a new building and the transfer of the collections. The Ornithological and Oceanographic Laboratories are scheduled for demolition in August 1999 and construction of a new building should begin in September 1999. Given the history of ornithology at Yale—given the careers of Marsh and Verrill, Ball and Ripley, Ostrom and Gauthier, Sibley and Ahlquist, and Brown and Beissinger—a new building will likely promote a resurgence in ornithological research at Yale.

ACKNOWLEDGMENTS

The history of ornithology at Yale and the Peabody Museum of Natural History could not have been completed without the generous assistance of many of the historical actors. An alphabetical list follows: Jon Ahlquist, Steven Beissinger, Charles R. Brown, George A. Clark, Jacques Gauthier, John Ostrom, Pamela Rasmussen and the staff of the Secretary Emeritus of the Smithsonian Institution, Charles G. Sibley, and Fred Sibley. Jon Ahlquist, Jacques Gauthier, John Ostrom, Noble Proctor, and Fred Sibley subjected themselves to lengthy interviews, as well. In addition, William Davis, Dan and Judith Davis, Jerome Jackson, Heather Lake, Noble Proctor, Fred Sibley, and Maria Trumpler reviewed earlier drafts. William Massa of Manuscripts and Archives at Yale and Barbara Narrendra of the Peabody Museum of Natural History Archives were both helpful in procuring photographs and unpublished records. I am very grateful to each of the people listed above. All interpretations and mistakes are mine.

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APPENDIX I

Ph.D. Dissertations Completed at Yale.

DATE	NAME	TITLE
1915	Ball, Stanley C.	The natural history and embryology of the rhabdocoele, *Paravortex gemellipara*.
1952	Huntington, Charles Ellworth	The subspecies of the Purple Grackle *Quiscalus quiscula*.
1954a	Paynter, Raymond Andrew, Jr.	The Ornithogeography of the Yucatán Peninsula.
1956	Cotter, William Bryan, Jr.	A serological analysis of the classification of the anatidae.
1957	MacArthur, Robert Helmer	Population ecology of some warblers of northeastern coniferous forests.
1964	Clark, George Alfred	Ontogeny and evolution in the megapodes (aves: Galliformes).
1964	Heimerdinger, Mary Anne	A study of morphological variation in the dorsal and ventral pterylae of passeriformes.
1964	Watson, George E.	Ecology and evolution of passerine birds on the Islands of the Aegean Sea.
1965	Ames, Peter Lesley	The morphology of the syrinx in passerine birds: its application to the classification of the Order Passeriformes.
1970	Kalma, Dennis L.	Some aspects of the breeding ecology and annual cycle of three populations of the Rufous-Collared Sparrow (*Zonotrichia capensis*) in western Panama.
1970	Morton, Eugene S.	Ecological sources of selection on avian sounds.

1970	Rothstein, Stephen I.	An experimental investigation of the defenses of the hosts of the parasitic Brown-Headed Cowbird (*Molothrus ater*).
1971	Baker, Myron Charles	A comparative study of the foraging ecology of six species of shorebirds (Charadriiformes, Charadrii) on their breeding and wintering ranges.
1971	Hollander, Peter	Adptations for echolocation in Cave Swiftlets (*Collocalia*).
1971	Lovejoy, Thomas E.	Diversity and abundance: patterns of lower Amazonian rain forest birds.
1971	Robertson, Raleigh John	Optimal niche space of the Red-winged Blackbird.
1974	Ahlquist, Jon E.	The relationships of the shorebirds (Charadriiformes).
1976	Tolonen, Karl Eric	Behavioral ecology of *Larus argentatus* and *Larus marinus*: age-specific differential in feeding efficiency, a probable factor in the evolution of delayed breeding.
1980	Padian, Kevin	Studies of the structure, evolution, and flight of pterosaurs (Reptilia: Pterosauria).
1980	Spendelow, Jeffrey Acton	Geographic variation in the ovotransferrins of the Red-winged Blackbird.
1982	Ridgely, R.S.	The distribution, status, and conservation of mainland parrots.
1983	Bottjer, Peter Diedrich	Systematic relationships among the Anatidae: an immunological study: with a history of Anatid classification, and a system of classification.
1984	Bledsoe, Anthony Hemingway	The phylogeny and evolution of the New World nine-primaried oscines, as indicated by DNA-DNA hybridization.
1986	Sheldon, Frederick Halsey	A study of the evolution and phylogeny of the herons (Ardeidae) using DNA-DNA hybridization.

1990	Stutchbury, Bridget Joan	Plumage color and reproductive tactics in male Purple Martins.
1996	Stoleson, Scott Harley	Hatching asynchrony in the Green-rumped Parrotlet: a multiple-hypothesis analysis.

4

Ornithology at the Denver Museum of Natural History

Charles R. Preston [1,3] *and Kristine A. Haglund* [2]

Abstract.—The history of ornithology at the Denver Museum of Natural History has been influenced by many notable figures, including Alexander Wetmore, Jesse D. Figgins, Frederick C. Lincoln, and Allan R. Phillips. But the influence of two men, Alfred M. Bailey and Robert J. Niedrach, dominates all others. These two literally brought the world of birds to Denver audiences and Colorado birds to the world. From its origin as the Colorado Museum of Natural History in 1900, the institution has consistently placed exhibits and public programming foremost in its mission. The relative emphasis placed on research collections development and original scientific inquiry has alternately waxed and waned according to trustee and staff orientation and background. Systematic collections include approximately 42,000 bird skins, 500 skeletons, and 6500 egg sets from around the world. Recent attention has focused on collections, research, and educational programming related to the avifauna of the southern Rocky Mountains and Great Plains of North America.

The Denver Museum of Natural History, incorporated as the Colorado Museum of Natural History on 6 December 1900, has supported ornithological fieldwork and collections development for nearly a century. When it opened its doors to the public for the first time on 1 July 1908, the Museum offered only exhibits to the public, but soon added educational programming and publication. Created as a museum for the 20th century, the Denver Museum made its foundation on a variety of 18th and 19th cen-

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tury innovations. To understand the collection development, research tradition, and educational mission, it is useful to have some understanding of broader influences that set the tone for the Denver Museum's early and subsequent development.

CULTURAL AND PHILOSOPHICAL CONTEXT

First and foremost, the Denver Museum of Natural History sprang from the public museum tradition developed in Europe and embraced in America, which accompanied an increasing democratization of society in the late 1700s and 1800s. The Philadelphia museum begun by Charles Willson Peale in the 1780s, a reflection of the American revolutionary spirit, stood as a benchmark in its devotion to the education of the public. Although Peale's museum closed in the early 1840s, it had a major influence on the public accessibility of museums that followed.

Louis Agassiz of the Museum of Comparative Zoology at Harvard, another 1800s popularizer of museums and natural history, also helped lay the ground work for natural history museums like the one in Denver (Alexander 1983). A dynamic lecturer, Agassiz traveled the country encouraging the building of natural history museums and expounding on the role of museums as centers of education and research. Albert S. Bickmore, a student of Agassiz, conceived the idea for the American Museum of Natural History and, in 1871, became its first director. Denver Museum founders patterned their administrative structure after the American Museum, with both institutions being incorporated by businessmen rather than by scientists or professors. Denver's first professional director, Jesse D. Figgins, was hired from the exhibit staff of the American Museum of Natural History.

Another student of Louis Agassiz, George Brown Goode, focused the attention of the growing ranks of professional museum administrators on the educational potential of museums. He encouraged curators to help educate the general public and railed against those who wanted to keep the masses out of museums. Goode, who prepared numerous World's Fair exhibitions for the Smithsonian Institution, often emphasized education and ideas over objects (Alexander 1983). Goode's broad influence was extended to Denver by Figgins, who worked under Goode in his early days at the Smithsonian.

John Cotton Dana proved to be another advocate for the public museum (Alexander 1983). Dana became the first librarian of the Denver Public Library in 1889. There, his egalitarianism launched a reformation of the entire library profession. He reveled in steadily increasing book loans, pioneered in opening the stacks to browsers, started the first children's room in the U.S., and loaned books to teachers for their schoolrooms. By 1909, just as the Denver Museum of Natural History welcomed some of its first visitors through its doors, Dana was successfully applying the same pro-public philosophies to a museum he founded in Newark, New Jersey. Many of his ideas permeated the professional museum community and challenged it to make museums friendlier and more valuable to their audiences.

World's fairs, a mid-1800s creation, also initially influenced the Denver Museum's founding and early operation. Boulder, Colorado collector and taxidermist, Martha Maxwell, exhibited her collection of birds and mammals at the 1876 Centennial Exposition in Philadelphia (Benson 1986). Regarding Maxwell's collection, Elliott Coues said, "While the collection embraced several specimens of high scientific interest, I regarded it as one of the most valuable single collections I had ever seen—far beyond the scientific value which any collection of animals of a locality may possess, it represented a means of popularizing natural history, and making the subject attractive to the public . . ." (Dartt 1879). In 1915, Professor Junius Henderson, curator of the University of Colorado Museum, said Maxwell's "was one of the earliest efforts in America to exhibit the animals of a large area in an imitation of their natural environment" (Benson 1986). Furthermore, he continued, ". . . one can scarcely doubt that such an exhibit at such a time must have at once stimulated work upon habitat groups." Mrs. Maxwell's museums in Boulder and Denver, as well as her World's Fair success, must have helped set the stage for the later founding of the Colorado (now Denver) Museum of Natural History by stimulating interest in such an enterprise.

Another World's Fair, the 1893 World's Columbian Exposition, attracted and inspired a number of future museum founders, including some from Colorado and Denver. This Chicago exposition, and the "City Beautiful" movement that it inspired, spawned many museums around the country, including Denver's natural history museum (Noel and Norgren 1987). Coloradoans, including those who would be key governmental supporters and founders of Denver's museum, as well as its first curators, visited and exhibited at the Chicago exposition. Edward T. Jeffery, who chaired the exposition's Grounds and Buildings Committee, soon moved to Denver and became a founding trustee of the Denver Museum of Natural History.

Strong public museum and world's fair influences combined to emphasize public entertainment, as well as education, in new museums at the turn of the century. Public funding, a main source of support, further compelled museums to focus their efforts not just on public service, but public appeal. For a relatively young city such as Denver, without the benefit of a large philanthropic pool, public funding assumed added importance.

THE MUSEUM'S FOUNDING

In 1859, 29-year-old Edwin Carter (1830-1900) arrived in Colorado and took up gold mining. During the winters, when mining operations were in a lull, Carter (Fig. 1) established himself in Breckenridge and manufactured buckskin clothing. This work apparently rekindled his love of nature and, when a mining venture went bad, he began to devote his life to the study of animals. In the Rocky Mountains near his home, Carter collected both birds and mammals, which he mounted or prepared as study collections

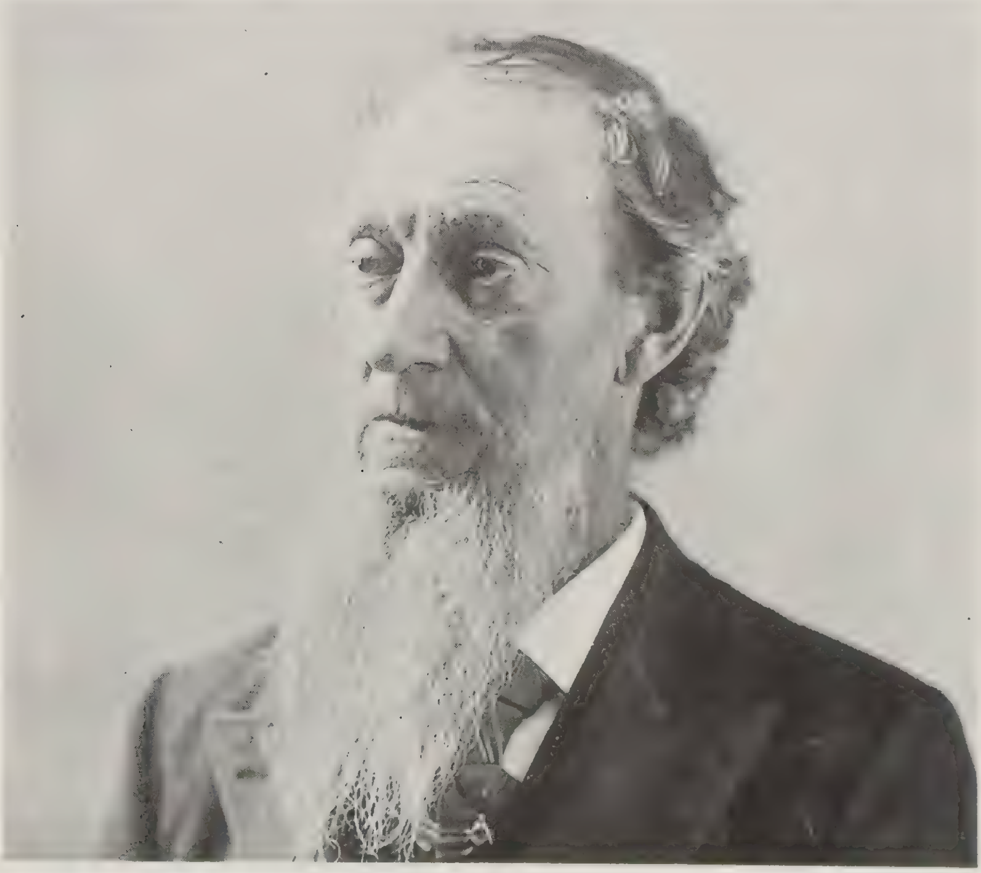

Fig. 1. Edwin Carter, ca. 1895. It was Carter's collection of mounted birds and mammals that provided the impetus for the founding of the Denver Museum of Natural History. Courtesy Denver Museum of Natural History Photo Archives.

and kept in his tiny log cabin at Breckenridge. He also purchased and exchanged specimens from taxidermists and other collectors to enhance his holdings. He sold duplicate specimens to other naturalists and museums, but only to make a living and support his work.

In 1875, as his collection expanded, Carter added a wing to his cabin that became known as "the museum." That same year, Carter declined an invitation to provide an exhibit for the 1876 Philadelphia Centennial Exposition because he had insufficient time to prepare enough specimens. According to Fiester (1973), however, it was reported after Carter's death that, "Professor Carter's museum was better known by scientists of distant parts of the world than by the people of Colorado. Among his visitors were professors of learned societies, collectors of natural specimens, tourists and men who traveled long distances to study the most remarkable collection ever made in the field of natural history by an unassisted individual." A reported 3300 documented specimens of birds and mammals comprised Carter's collection and must have overflowed his small cabin.

On 1 June 1892, a party of prominent Denver citizens seeking displays for the 1893 Chicago World's Fair visited Breckenridge. Their visit to Carter's museum resulted in a movement to relocate the collection to Denver. Ten days later, Carter offered his conditions for cooperating in an effort to found a natural history museum in Denver. Little progress was made for several years, however, and Carter's health deteriorated.

The first formal meeting of potential trustees to consider ways and means for the establishment of a Museum did not occur until December 1897. Within the next month, plans for the new museum's future site, construction, operational budget, and sources of funding were set in motion. Founding trustees recommended the incorporation of the Colorado Museum and Library Association with the Constitution and By-Laws of the American Museum of Natural History of New York as adapted to Colorado laws. Further progress, however, awaited fundraising efforts.

Finally, on 18 December 1899, the trustees agreed to pay, and Carter agreed to accept, $10,000 payment for his collection and a salary of $150 a month as Curator for Life. But before a month had passed or a dime was paid, Carter, in very poor health, sought the warmer climate and lower altitude of Galveston, Texas. It did not help. On 3 February 1900, he died, probably as a result of repeated exposure to the arsenic used in preserving his specimens.

The City of Denver had committed a building site and a portion of the funds needed for construction. Carter's death, however, left the fate of his collection in the hands of his New York heirs, who doubled the asking price for their relative's work. After much dickering, the family eventually agreed to the sale of Carter's collection for the originally agreed upon price of $10,000.

At last, construction of Carter's long awaited Denver museum began on 18 November 1901. The Department of Birds was organized soon after the Carter collection was purchased. While awaiting permanent housing, the collection was placed in storage, and either through ignorance, indifference, or carelessness, many specimens were ruined. Enough remained, however, to enable the association to prepare and install a few habitat groups. Remaining skins and eggs formed the foundation of the research collection. Some of the Carter collection duplicates were traded by the Museum to other institutions, and some were given to Denver's East High School.

Bird specimens itemized in an estate inventory for probate purposes included 161 White-tailed Ptarmigans (*Lagopus leucurus*), two Bald Eagles *(Haliaeetus leucocephalus*), three Golden Eagles (*Aquila chrysaetos*) and a collection of birds' eggs. Carter had collected ptarmigans to study their seasonal variation. Significant contributions to ornithology based on Carter's collection were listed by Frederick C. Lincoln (1929).

EARLY STRUGGLES

The fledgling Colorado Museum of Natural History suffered through some precarious years when funding was problematic. Building construction was agonizingly slow. Operating on a low or nonexistent budget, the Board of Trustees hired no director. Instead, John T. Mason (1853-1928), a founding trustee and amateur lepidopterist, was placed in charge of the museum at no pay. His primary responsibilities were directed toward the building of habitat exhibits for which he obtained exhibit case specifications from the Field Museum of Natural History in Chicago.

In early 1901, Mason employed a local taxidermist, Rudolph Borcherdt, to collect additional specimens for exhibit and remount the Carter specimens, the taxidermy of which reportedly "left much to be desired" (R. B. Rockwell *in* Hanington 1938). Meanwhile, Mason helped in the acquisition process by corresponding with dealers and anyone else who could help fill the gaps in existing collections. Victor Borcherdt, Rudolph's son, soon joined the Museum's staff. Until 1910, as funding allowed, he divided his time between collecting, preparing taxidermy, and constructing exhibits.

Robert B. Rockwell (1883-1941), an amateur oologist, came to the Museum in 1906, without pay, to unpack and organize Carter's extensive collection of birds' eggs. To accomplish this task, Rockwell was forced to unscramble Carter's data that had been recorded on scraps of brown wrapping paper, impaled on loops of baling wire, and filed in burlap bags. Rockwell's work, tedious but obviously essential, was the first systematic curation undertaken for the new museum. Rockwell (Fig. 2), an investment banker by profession, went on to serve on the Museum's Board of Trustees.

Luman Joel Hersey (d. 1924) came to work as the Museum's first titled Curator of Birds at least as early as 1909. In this first recorded year of work, he adopted an index card system for his record keeping and brought all cataloging up to date. He also began to build the study collection. Hersey, who retired from the museum in the fall of 1913, was known as an enthusiastic hunter and a lover of duck shooting. Mr. Hersey was widely known as a naturalist and respected for his knowledge of the bird and floral life of Colorado.

In 1909, Hersey was assisted by none other than Alexander Wetmore (Fig. 3). Not even important enough to be added to a staff list or mentioned in the annual report, Wetmore was a student from the University of Kansas, in February 1909, when Hersey hired him at a salary of $85 a month. Funds were short, and Wetmore stayed only eight months. During those months, he conducted fieldwork and kept copious field notes (originals reside in the Smithsonian Institution Archives). He was also assigned to mount birds for exhibits and to prepare skins for the study collection. "On my arrival," he says, "the laboratory room was crowded with large boxes containing mounted birds from the old Carter collection. These were supposed to be worthless and I was told to discard and destroy them. Many were damaged beyond repair as heads and wings were missing, but a fair number were in good shape. These I salvaged to be retained in the collection, including a few record specimens for the state. In this I went against definite orders, but I could not bring myself to destroy valuable material as I realized that the order came through a misunderstanding of its worth" (Hanington 1938). Wetmore left the Museum in November 1909 to continue studies at the University of Kansas. He later became the director of the National Zoo, the National Museum of Natural History, and, in 1945, the sixth Secretary of the Smithsonian Institution.

Financial troubles had plagued the Museum since its opening to the public in 1908. More than once, Denver's mayor intervened to keep the struggling institution alive. The Board of Trustees realized that the time had come for a paid professional to get the budget under control and chart the institution's course.

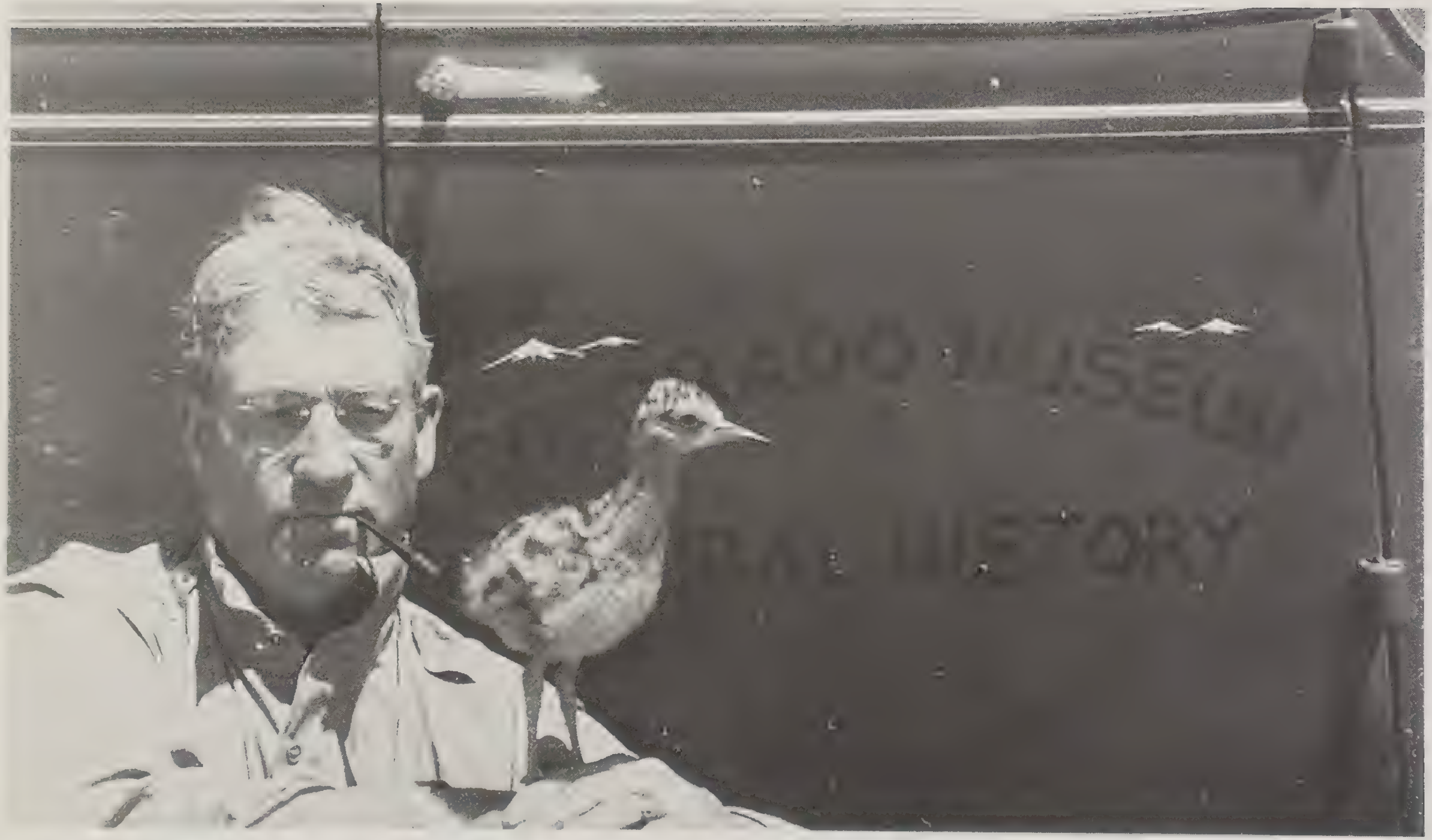

Fig. 2. Robert B. Rockwell, ca. 1940. Rockwell navigated the maze of Edwin Carter's haphazard records system to organize Carter's oology collection for the Museum. Courtesy Denver Museum of Natural History Photo Archives.

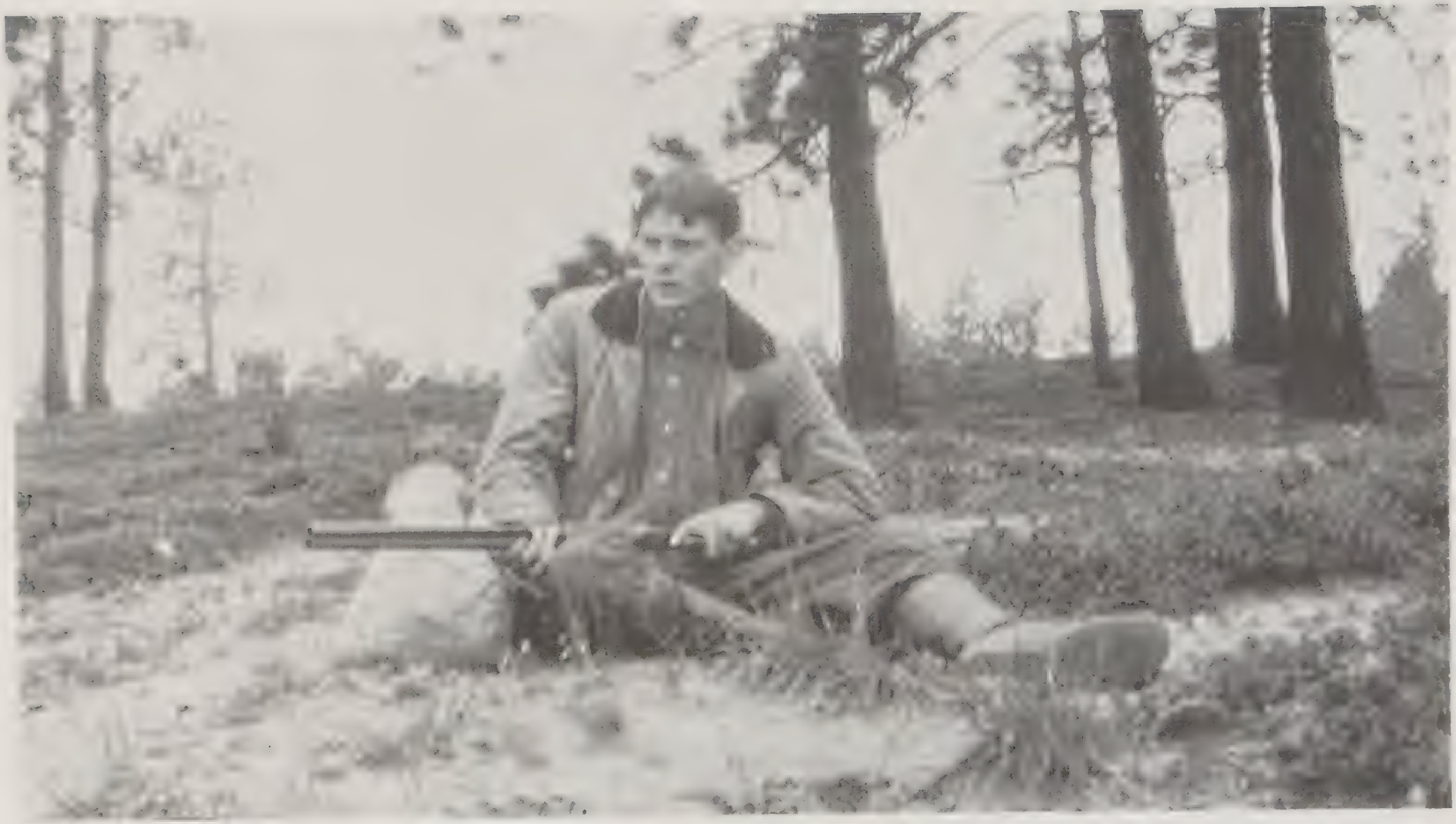

Fig. 3 Alexander Wetmore, Palmer Lake, Colorado, 1909. During his brief employment with the Museum as collector and preparator, Wetmore made a significant contribution by failing to follow instructions to discard valuable specimens from Edwin Carter's collection. Courtesy Smithsonian Institution Archives, Record Unit 7006, (Alexander Wetmore Papers, negative #1916).

PROFESSIONAL GUIDANCE

In July 1910, Jesse Dade Figgins (1867-1944), became the Colorado Museum of Natural History's first paid professional director. Figgins (Fig. 4) was a seasoned professional by the time he came to Denver. Ornithology, mammalogy, and herpetology were Figgins' first scientific interests and he worked for a time for the U.S. National Museum in Washington, D.C. He studied birds and mammals in the Potomac Valley from 1887 to 1895, and in 1896 made a biological survey of the Great Dismal Swamp. He was named as ornithologist and mammalogist of the Sixth and Seventh Peary expeditions in 1896 and 1897, accompanying the commander on both trips. He collected many mammals and birds, which proved so interesting to the American Museum of Natural History, the institution receiving them, that Mr. Figgins was asked to join its staff.

On the staff of the American Museum of Natural History, Figgins conducted fieldwork in a variety of locales, including Nova Scotia, Alaska, Cape Cod, and Washington state. He was also acquainted with diorama design and development, having trained as a foreground preparator under Frank Chapman and John Rowley. As head of the Department of Preparation, he prepared taxidermy, built habitat exhibit foregrounds, and painted exhibit backgrounds.

Upon his arrival at his new museum in Denver, Figgins found a carpentry shop, a small art gallery, mineral exhibits on the first floor, mammal exhibits on the second floor, and bird exhibits on the top floor. The building, situated in the still developing City Park, was surrounded by native vegetation; no paved walkways or landscaping existed. The staff was small. In his new position, Figgins found many challenges and moved quickly to establish a professional and balanced program of activities. He (Figgins 1911) viewed the Museum as standing at a crossroads: "The Colorado Museum of Natural History has arrived at the point in its development where it must either confine itself to the lines of work that will place it with the majority of like institutions, or profitably join the few that are striving to attain their highest plane of usefulness by becoming centralized places of learning in all branches of natural history."

Early in his administration Figgins improved the accuracy of exhibits, began programs for schools, started a publication program, instituted efficiencies in staffing, broadened the collecting interests, emphasized the importance of documentation, introduced the museum to both still and motion picture photography, and publicized the museum's activities. He built the study collections and expanded the fieldwork program to systematically collect the bird and mammal species of the state and acquire

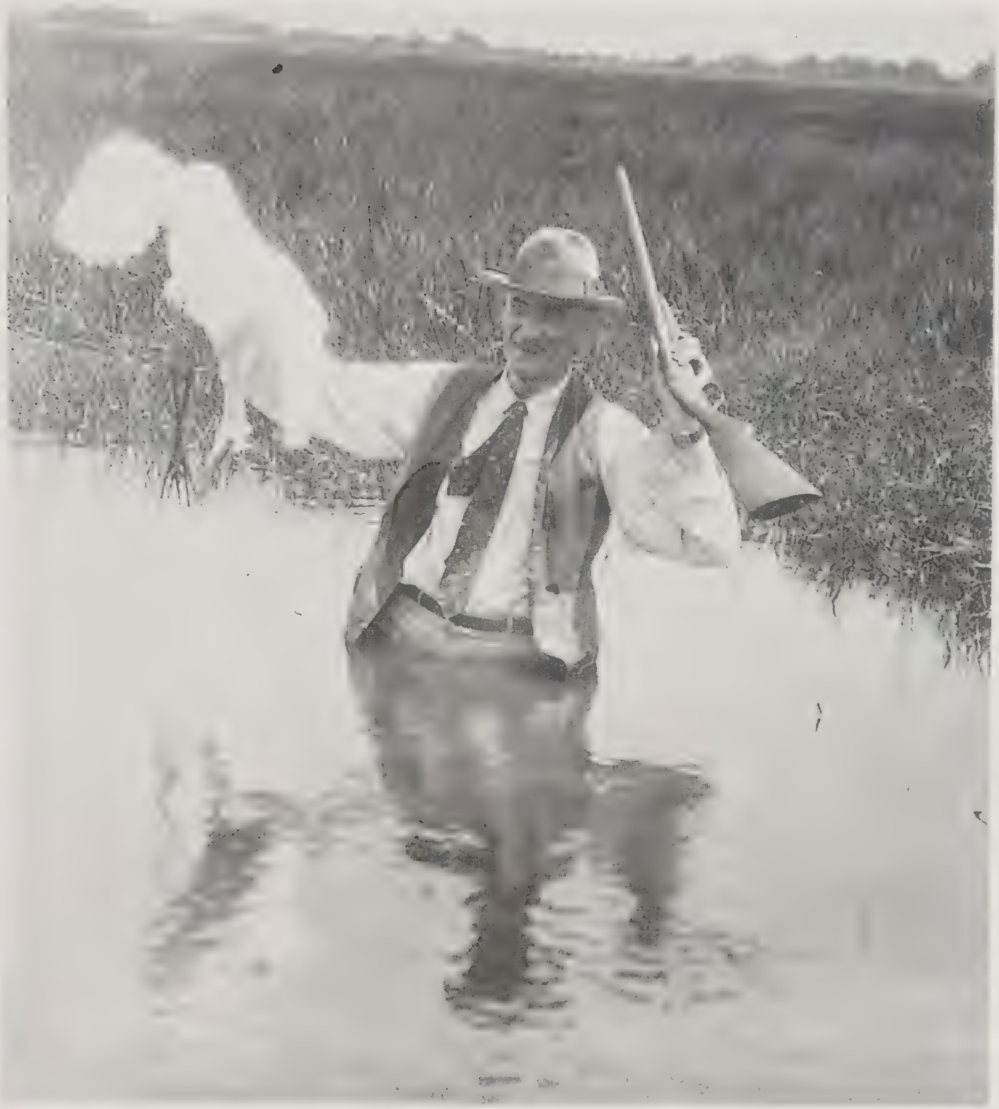

Fig. 4. Jesse D. Figgins, first professional director of the (then) Colorado Museum of Natural History, Berheice, British Guiana, 1928. Courtesy Denver Museum of Natural History Photo Archives.

first records of species for Colorado. He also published on a variety of ornithological topics (e.g., Figgins 1918, 1925, 1930). Two major building additions were constructed under his watch. When he resigned his Denver directorship in a dispute with the Board of Trustees in 1935, paleontologist Barnum Brown (unpubl. corresp., Brown to C. H. Hanington, Denver Museum of Natural History Archives) of the American Museum wrote that he considered Figgins to be "the best all-round museum man in the entire country."

In 1914, Figgins hired Frederick C. Lincoln (1892-1960) to replace L. J. Hersey as Curator of Birds. Lincoln remained in this position until called to service in World War I, on 10 May 1918. Lincoln joined the U.S. Biological Survey in 1920, where he remained until his death in 1960, rising to the upper levels of administration. He directed bird-banding operations for the Survey, and is credited with developing the migratory flyway concept (Gabrielson 1962).

Lincoln (Fig. 5) learned the art of preparing bird skins at the Denver Museum from Alexander Wetmore in 1909. Born in Denver, Lincoln attended the University of Denver (1912-1913) and first joined the Museum's staff in 1912. As the Museum's Curator of Birds, Lincoln continued the biological survey of Colorado begun by Hersey, collecting specimens and compiling detailed field notes. Specimens were collected primarily for exhibition purposes, but significant systematic collecting rounded out the public study collections. First-record specimens were taken whenever possible.

In 1916, the Museum purchased the Austin Paul Smith collection of birds, consisting of 732 specimens representing 380 species and subspecies. Some were incorporated into exhibits, but the main value of the collection was characterized by Lincoln (1916) as "the number of rare specimens from, or near, type localities."

In 1914, Figgins appointed William Chase Bradbury (1849-1925) as Honorary Curator of Oology. Bradbury proposed that he acquire the small egg collection belonging to the Museum and, in return, that he supply representative sets of all the North American species and subspecies he could obtain. He collected birds and eggs in all parts of the state, adding greatly to knowledge of the distribution, life histories, and breeding habits of Colorado birds. He helped produce an exhibit that served as an introduction to the study of eggs and nests and included examples illustrating types of eggs, variations in color, protective coloration, and nest architecture.

Bradbury (Fig. 6) maintained a keen interest in hunting and fishing, and he held that propagation of wild populations was as much a duty as taking game was a pleasure. It was through his efforts that the Scaled Quail (*Callipepla squamata*) was introduced in the vicinity of Colorado Springs, from which point this species has populated much of the upper Arkansas River Valley. At his death he had made no provision for the disposition of his large personal collection of North American birds' eggs, but his wife donated them to the Museum along with a related library.

Beginning in 1913, Director Figgins petitioned potential donors for funds to enlarge the building. Only four years later, Ellen M. Standley donated the new Joseph M. Standley wing. In 1917, with the imminent reality of new space, the Museum extended its collecting beyond the

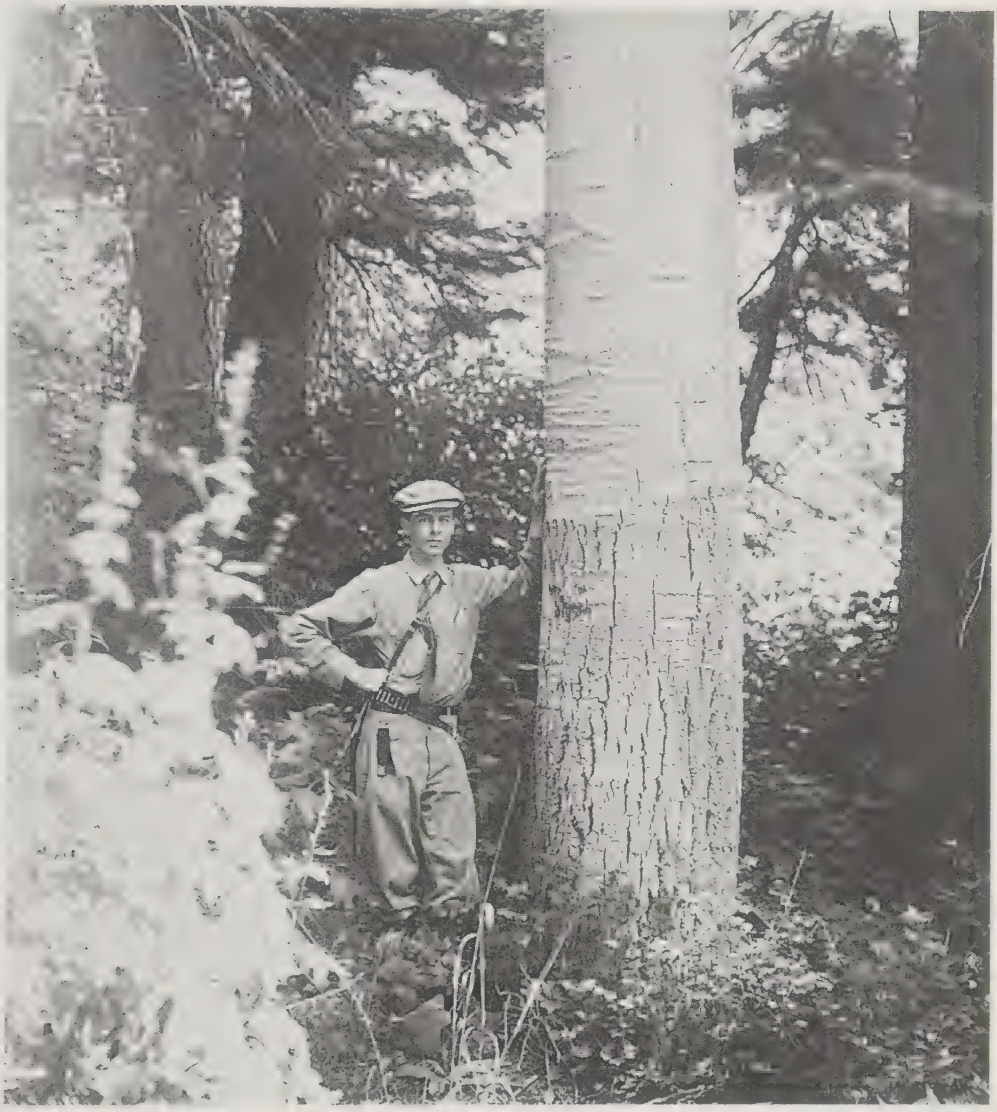

Fig. 5. Frederick C. Lincoln, on the Navajo River, Archuleta County, Colorado, 1913. Lincoln served as Curator of Birds 1914-1918, before a long and distinguished career with the U.S. Biological Survey. Courtesy Denver Museum of Natural History Photo Archives.

borders of Colorado. Figgins, along with Lincoln and preparator A. H. Burns, headed a bird collecting expedition to South Carolina and Florida (see Figgins 1918).

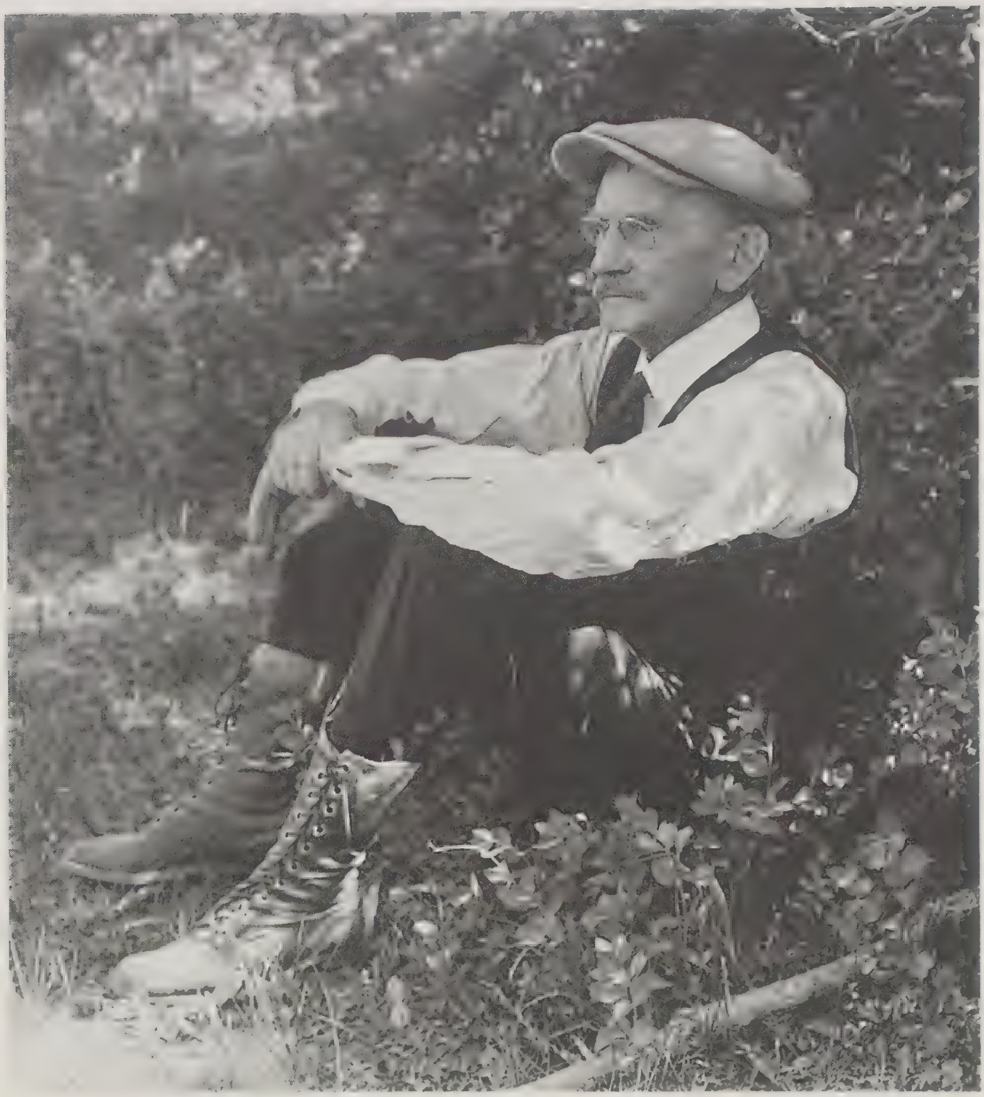

Fig. 6. William C. Bradbury (ca. 1920), prolific collector of bird eggs. Bradbury served the Museum as Honorary Curator of Oology and Trustee. Courtesy Denver Museum of Natural History Photo Archives.

THE POST-FLEDGING PERIOD: EXPANSION, EXPLORATION, AND PUBLIC OUTREACH

The Colorado Museum of Natural History continued to expand its interests beyond state boundaries. In 1918, specimens and exhibit materials acquired through exchange and the help of local sportsmen made possible an exhibit of the winter birds of the Louisiana Gulf Coast. Exchanges for the Louisiana exhibit were arranged through Alfred M. Bailey (1894-1978), then curator of birds and mammals at the Louisiana State Museum in New Orleans. Bailey again assisted the Denver Museum in 1919, accompanying Director Figgins and Frederick Lincoln when they made a collecting trip to Louisiana.

A graduate of the University of Iowa in 1916, Alfred M. Bailey, studied museum techniques under Homer R. Dill, head of the oldest museum studies program (begun 1907) in the United States. Through Dill, Bailey got his first field work as camp cook and field member of the 1912-1913 U.S. Biological Survey to Laysan Island. Under Dill he also learned taxidermy and related exhibition techniques, as well as Dill's (1916) philosophy, i.e., "it is the impression that an exhibit makes on the spectator that counts."

In 1916, accompanied by Dill, 22-year-old Bailey attended his first American Association of Museums (AAM) meeting in Washington, D.C. There he toured museums and had the opportunity of listening to presentations on topics ranging from the technical to the philosophical. Bailey heard John Cotton Dana (1916) deliver one of his rousing speeches, where he made clear his philosophy that museums, "should give returns for their cost and those returns should be in good degree positive, definite, visible, [and] measurable."

At the AAM meeting, Bailey met Robert Glenk, Director of the Louisiana State Museum in New Orleans. Bailey recorded in his journal, "He [Glenk] needs a man, and from the report he gave, it seems a highly desirable place. Brown, of the National [Museum], would like it. I feel that I have a chance, and will make the best of it." Bailey's best was good enough. Glenk hired him to start in July 1916, as Curator of Mammals and Birds, a position he held for three years. In the summer of 1919, Bailey was offered not one, but two, attractive positions. One position was offered by Director J. D. Figgins, in Denver's natural history museum, and the other from E. A. Nelson, Chief of the U.S. Biological Survey. Nelson offered Bailey the opportunity to become the first representative of the Survey in Alaska. Bailey accepted the latter position, which he held for two years before finally being lured to Denver.

Bailey's Survey work in southeastern Alaska (1919-1921) provided him with both experience and contacts that the Denver Museum found extremely valuable when it hired him in 1921. Bailey's first assignment at Denver as Curator of Birds and Mammals was an eighteen-month expedition to arctic Alaska (1921-1922) to collect bird and mammal specimens for exhibit, study, and exchange (Fig. 7). In addition, contacts made by Bailey in Alaska, such as Charles D. Brower of Point Barrow, continued to provide the Museum with Alaskan specimens for decades to come.

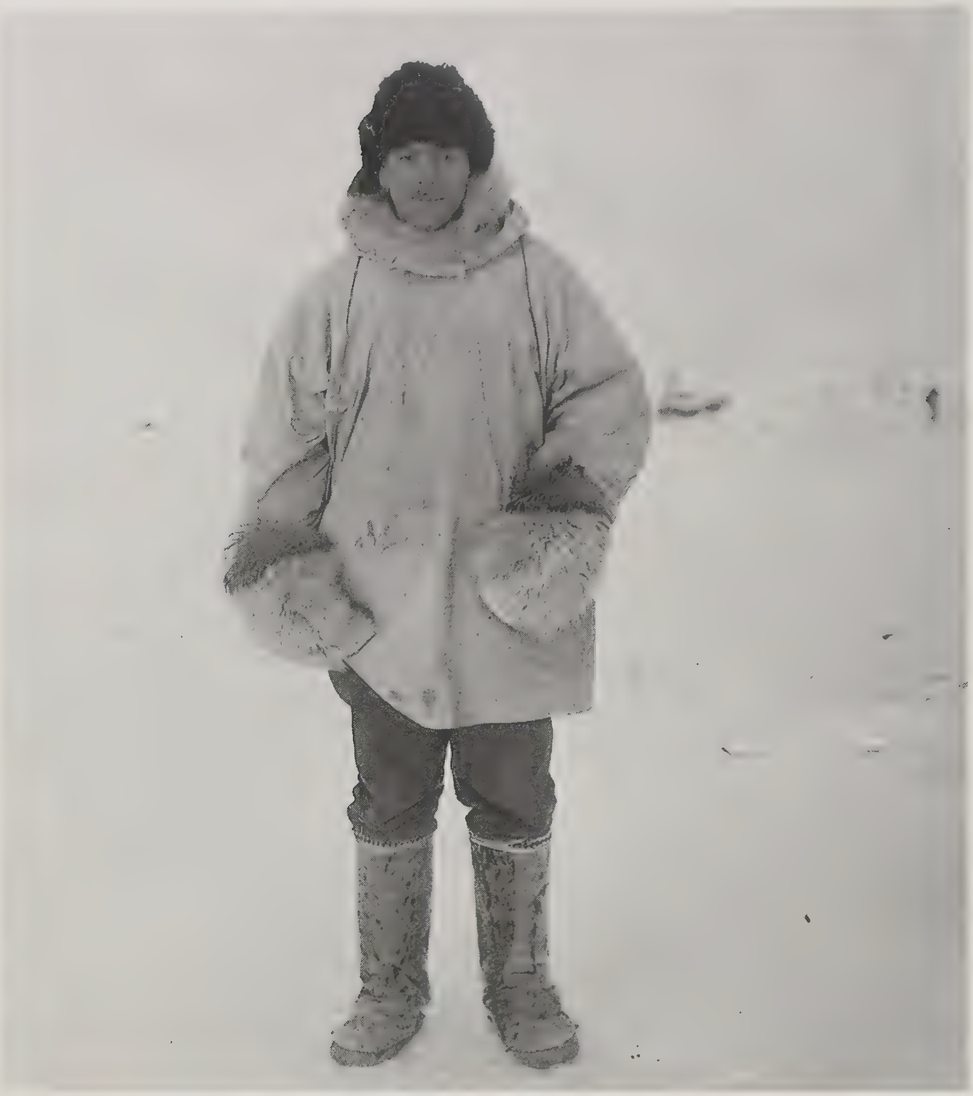

Fig. 7. Long-time Denver Museum curator and director, Alfred M. Bailey, in arctic Alaska, 1921. Bailey, more than any other individual, forged the countenance of the ornithology program, and indeed, the Museum in the 20th century. Courtesy Denver Museum of Natural History Photo Archives.

Bailey's curatorial career at Denver lasted until 1926 and included fieldwork and bird specimen collecting in the Bahamas and Quebec (1923), and Bonaventure Island (1924), as well as Utah and Colorado. Although scheduled to go to South America in 1925-1926 on the Museum's most ambitious foreign collecting trip to date, Bailey was dropped from the trip four months before departure. During this expedition, led by Frederic

W. Miller, Fred G. Brandenburg, and Frederick E. D'Amour, bird and mammal specimens were collected in Brazil, Argentina, Paraguay, and Patagonia. Disappointed and pessimistic about his future under Director Figgins, Bailey began to look for opportunities elsewhere. He preferred fieldwork to laboratory assignments, and found his opportunity with the Field Museum of Natural History. In 1926 and 1927 he accompanied Wilfred H. Osgood and Louis Agassiz Fuertes, Jack Baum, and Suydam Cutting on a 2000-mile muleback journey through Abyssinia.

Back in Chicago in May 1927, Bailey became director of the Chicago Academy of Sciences. Mrs. Bailey, "with two lively children . . . and rather fed up with [his] being away so much," (A. M. Bailey, unpubl. ms) accepted the job for him in his absence. As a result a planned trip to Indo-China was canceled, but Bailey continued to conduct fieldwork within the United States during his Chicago years (1927-1936). Some field projects were conducted in cooperation with the Denver Museum, where he maintained close friendships. In 1930, Bailey engineered an exchange whereby more than 500 bird specimens were sent to Denver from The Chicago Academy of Sciences. Among these were at least 200 specimens from the Steere Philippine expedition [See also Payne, this volume p. 5].

At the end of 1935, in Denver, Director Figgins became embroiled in a disagreement with members of the board of trustees, reportedly over a proposed expedition to Central America. The trustees won. With Figgins' resignation, the post of director became available. Enthusiastic encouragement from two Denver trustees and unanimous approval from the rest, convinced Bailey to head back to the Rocky Mountains. Although sorely missed in Chicago, Bailey loved Colorado. The Denver Museum of Natural History became his base of operations until his retirement at the end of 1969. It was under Bailey's direction that the institution became known as the Denver Museum of Natural History. The legal name has never been changed from the Colorado Museum of Natural History, but, in 1948, at the request of the mayor and city council of Denver, the popular name became the Denver Museum of Natural History.

Like his teacher, Homer Dill, Bailey was an active field ornithologist and museum collector. As Bailey (1971) explained, "Field work, whether in local or faraway places, has been the lifeblood of natural history museums . . . It should be noted that only by collecting through the years has it been possible to acquire accurate information upon which are based the thousands of publications portraying the geographic distribution of plants and animals. Museums now have extensive series of specimens from all parts of the world, and general collecting in well-known areas is no longer necessary, but until comparatively recently it was the duty of naturalists not only to record the life history habits of species of interest, but to preserve specimens to authenticate their observations."

Major field expeditions led by Denver Museum of Natural History staff have largely been linked directly to exhibits development. Key expeditions in the institution's history include forays to Alaska, Australia, New Zealand and Campbell Island, Brazil, the Galapagos Islands, and Botswana. These adventures were driven by a mission to bring distant parts of the world to landlocked Denver and Colorado citizens. Bailey initiated and participated in most such expeditions during his tenure at the Museum, and ensured that specimens were collected for scientific, as well as exhibits, use. Additionally, Bailey engineered specimen exchanges with many collectors and institutions over the years. Due to Bailey's ornithological passion, bird specimens constitute arguably the most significant collection held in trust by the Denver Museum of Natural History.

Bailey documented his work in 20 volumes of field notes and thousands of photographic images, including motion pictures. In addition, he published widely, both in popular and scientific venues. His most lasting contributions include *Birds of Arctic Alaska* (Bailey 1948) and *The Red Crossbills of Colorado* (Bailey et al. 1953), in addition to the enduring standard, *Birds of Colorado* (Bailey and Niedrach 1965). Bailey's voluminous documentation, both published and unpublished, continues to make his work valuable to new generations of researchers. As a great popularizer of natural history, he also brought international recognition for excellence to the Denver Museum through its exhibits. In 1936, when he first arrived at the Museum as its director, he made renovation of habitat groups his top priority. With the Field Museum of Natural History and American Museum of Natural History serving as examples of scientific, technical, and artistic quality, Bailey instituted the latest innovations. With the help of Work Projects Administration employees, he began to replace old-fashioned exhibit cases with curved and domed diorama shells and illuminated them with fluorescent lights. These habitat dioramas, though completed 60 years ago, continue to draw new and repeat visitors to the Museum. Norwich University awarded Bailey an honorary Doctor of Science degree in 1944. In 1954 he received an honorary Doctor of Public Service degree from the University of Denver (Phillips 1981).

Robert J. Niedrach (1889-1974) was Alfred M. Bailey's alter ego, and the two maintained a close personal relationship, as well as closely linked professional lives from the time they first met in 1921. Niedrach (Fig. 8) was first employed by the Museum in 1912 as a preparator of birds, and accompanied Lincoln on bird collecting expeditions throughout Colorado between 1915 and 1920. He was named Curator of Birds in 1935, the first person to hold that position since Bailey had departed in 1926. Niedrach held the position until a reorganization in 1968, when he became Curator of Zoology (1968-1969), and subsequently Ecologist and Curator of Biology (1970). He also held the positions of Assistant to the Director between 1949 and 1967 and Assistant Director in 1969-1970. Bailey and Niedrach co-authored several publications, most notably the two-volume tome describing occurrence and distribution of the birds of Colorado (Bailey and Niedrach 1965). They conducted extensive fieldwork together. When Director Bailey left town on his annual lecture tour, he usually placed Niedrach in charge of the Museum for extended periods. It is frequently difficult to separate the work of the two. Though personally and professionally admired by all who knew him, Niedrach's work is under-credited in published sources.

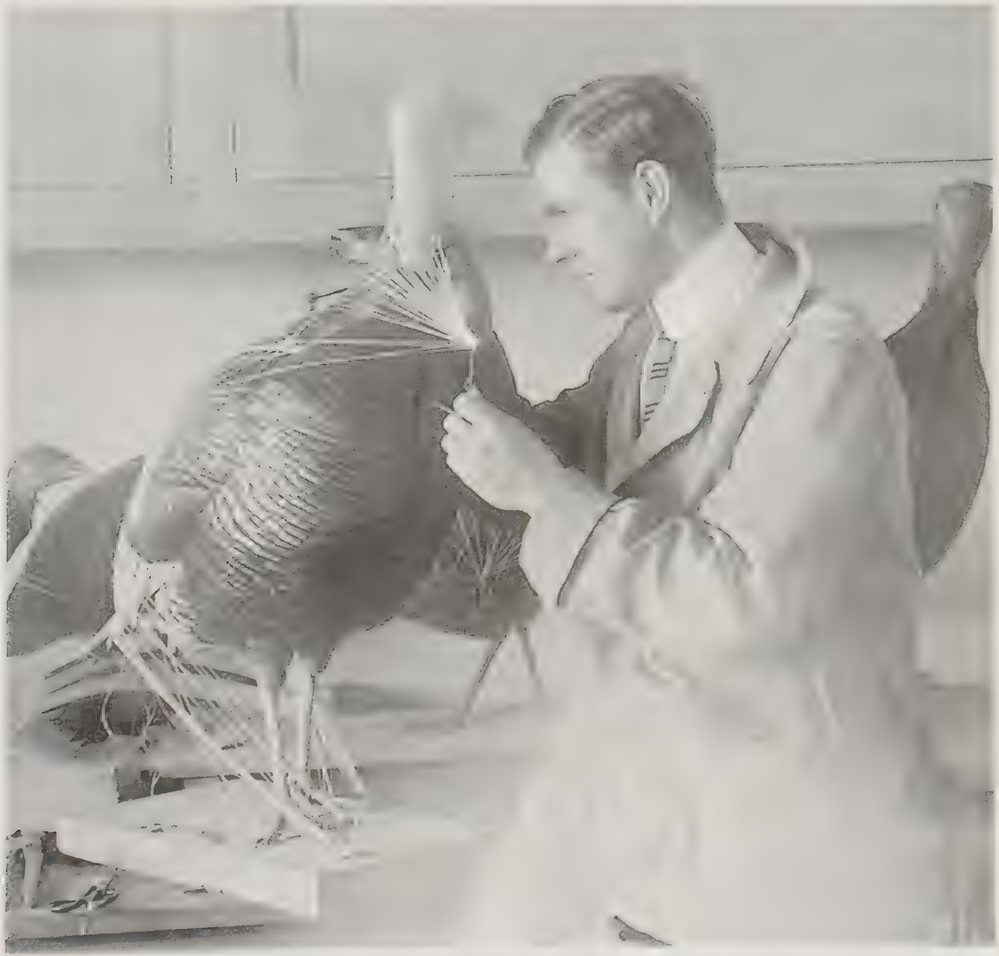

Fig. 8. Robert J. Niedrach (ca. 1913), a popular and influential figure during his 58-year association with the Museum. Courtesy Denver Museum of Natural History Photo Archives.

Niedrach's particular strengths revolved around fieldwork and exhibit work. He supervised the installation of more than 50 of the Museum's habitat dioramas. Niedrach's observational, interpretive, and photographic skills were valued by Bailey and many others. Though best known for his work in ornithology with Bailey and others (e.g., Niedrach and Rockwell 1939), Niedrach was an outstanding all-around naturalist. He was fully committed to the Museum's educational role and contributed to its fulfillment through teaching and lecturing, as well as exhibits. He helped found the Colorado Bird Club in 1935. This organization has become the Denver Field Ornithologists, one of the most active community birding clubs in the nation. Niedrach also worked extensively with the Boy Scouts of America and Camp Fire Girls. He is credited with helping to establish the Museum's Education Department in 1969. He retired the next year.

Niedrach's early interest in nature, and birds in particular, derived from prowling the meadows along the Hackensack River and the Palisades near his New Jersey birthplace. Frank M. Chapman, curator of birds at the American Museum of Natural History, had an early influence on Niedrach, who accompanied Chapman in local fieldwork. Niedrach's career with the Denver Museum even paralleled Chapman's, as a biological collector, nature educator, and preparator of lifelike museum habitat groups.

Niedrach's fieldwork outside the U.S. included Central America (1935-1936), Mexico (J. R. Pemberton-Colorado Museum Mexican Expedition, 1940), mid-Pacific islands (1949), Australia and Fiji (1952). In 1950, he worked with the National Geographic Society and Harold E. Edgerton, of the Massachusetts Institute of Technology, to field test new equipment devised by Edgerton for natural history high-speed photography in the field. The University of Colorado presented Robert Niedrach with an Honorary Master of Science Degree in 1953 and with an honorary Doctor of Science degree in 1967.

REDIRECTION, CONSOLIDATION, AND COLLECTIONS CONSERVATION

Near the end of Bailey's and Niedrach's careers at the Museum, the bird collection, indeed virtually the entire zoological collection, was stored in boxes, inaccessible to researchers or the public. The Department of Birds had been combined with the Department of Mammals, and the Department of Entomology to form the Department of Zoology in 1947, but by 1970, it was subsumed by the newly-created Department of Natural History Exhibits. During their careers at the Museum, Bailey and Niedrach had not hired or groomed young professionals to focus on scientific and collections responsibilities, and from the late 1960s through the early 1980s, the Museum leadership chose to emphasize public programming over collections development and research.

Inspired by discussions with Niedrach, however, Elizabeth A. Webb (1947-), initially employed in 1970 as an exhibits preparator, began reorganizing, rehousing, and tending to conservation of the bird collection. She was named Curator of Zoology in 1972. Gaining the support of Director Charles Crockett, Webb consolidated all zoological research collections and, in 1974, founded and was named head of the Department of Zoological and Special Collections. This was the first time in the history of the institution that zoological collections and activities were not administratively attached to an exhibits preparation function. The department eventually became the present-day Department of Zoology. Initially trained in Anthropology at the University of Colorado, Boulder (B.A. 1969), Webb (Fig. 9) became increasingly interested in birds, and was granted a leave of absence from the Museum (1980–1982) to pursue graduate study in ornithology under Carl E. Bock, at the University of Colorado. In her absence, the zoological collections were managed by Paisley Seyfarth Cato and Charles A. Chase III. Based in part on her experience in Denver, Cato (1986) authored a widely-consulted manual for management of bird collections.

Webb completed her M.A. in 1985. Her graduate research focused on Botteri's Sparrow (*Aimophila botterii*), and formed the basis for several publications (e.g., Maurer et al. 1989, Webb and Bock 1990). Webb extended her interest in natural history collections conservation and became an active member in the Society for the Preservation of Natural History Collections. Perhaps her most lasting contribution to ornithology at the Denver Museum of Natural History lies in her successful efforts to reorganize and rehouse the entire research collection in appropriate cabinetry and institute an integrated pest management program for the zoological collections (Webb et al. 1989). Webb left the Museum in 1992 to become the Curator of Collections at the Pratt Museum, Homer, Alaska.

Another prominent figure in the Museum's ornithological history in the 1970s and 1980s was Allan R. Phillips (1914-1996), contracted by Webb to serve as a part-time bird taxonomy consultant in the Department of Zoology from 1975-1990. Phillips was a well-known avian taxonomist of complex, sometimes endearing, sometimes prickly, character. He earned graduate degrees from the University of Arizona (M.S. 1939) and Cornell University (Ph.D. 1946), and published 168 papers and 4 books between 1933 and 1995 (Dickerman and Rea 1997). He was a profoundly independent researcher throughout his life, funding his work primarily through

Fig. 9. Elizabeth A. Webb (ca. 1982) organized and guided conservation of all zoological collections through the 1970s and 1980s. Courtesy Denver Museum of Natural History Photo Archives.

adjunct teaching and research affiliations with a number of institutions in the United States and Mexico. A substantial portion of the two volumes of *The Known Birds of North and Middle America* (Phillips 1986, 1991) was written while he was in residence at the Denver Museum of Natural History (Fig. 10). His work in identifying type specimens was critical to the Museum's curatorial efforts, and he and Webb described the few avian type specimens housed in the Museum (Phillips and Webb 1991). He also taught popular workshops on bird identification for local birding groups.

Fig. 10. Allan R. Phillips (1986) wrote much of *The Known Birds of Middle and North America. Vols. I and II,* while in residence at the Museum. Despite the encouragement and assistance of many colleagues, Phillips maintained a healthy distrust for electronic word processing until his death in 1996. Courtesy Denver Museum of Natural History Photo Archives.

Phillips was a careful critic of anyone unclear or wrong about his facts and did not hesitate long in his attempt to put the record straight according to Phillips. But he was also known for enthusiastically sharing his knowledge of the birds he loved and loved to study. He often entertained staff and volunteers alike with his recitations of the poetry of Robert William Service. Although not employed by the Museum after 1992, Phillips continued to study the collections off and on until his death.

Shortly before his death he was treated to a surprise 80th birthday party in the Museum's VIP Room. In turn, he treated all to a spirited, Phillipsian rendition of Service's *The Cremation of Sam McGee.*

NEW RESOURCES, NEW THEMES, NEW CHALLENGES

Soon after Elizabeth Webb returned to the Museum from graduate studies, she began planning for expansion of the zoological staff. She eventually convinced the Museum administration to hire a full-time specialist in ornithology. Peter B. Stacey resigned his tenured position as Associate Professor at Indiana State University, to assume the newly-created position of Curator of Ornithology at the Denver Museum of Natural History in June 1986. Stacey was aggressive in his pursuit of improved collections space and facilities for the bird collection. The Museum was undergoing a transition, and the administration was beginning to increase emphasis on collections and research. But the transition was slow, and Stacey's ambition and aggression were not met with complete support from an interim Museum management team. Stacey left the Museum in January 1987, after only seven months of employment. After Stacey's departure, direct management of the bird collection was delegated by Webb largely to part-time contract personnel, notably Phillips and Michael F. Carter, the founder and current Executive Director of the Colorado Bird Observatory.

In 1989, Denver area voters approved a Scientific and Cultural Facilities District tax to help fund local institutions, including the Denver Museum of Natural History. The tax brought in approximately $1.3 million (approximately 11% of the annual budget) to the Museum during the first year. A new Executive Director, John G. Welles, and a new Chief Curator, Jane S. Day, were on board, and both were committed to strengthening the Museum's collections and scientific presence. In the wake of the tax windfall, the Museum hired a new Curator of Ornithology. Charles R. Preston (1952-) resigned his position as Associate Professor of Biological Sciences at the University of Arkansas at Little Rock to accept the new challenge in Denver.

Preston had assisted curation of bird, mammal, and herpetofaunal collections at the Arkansas Museum of Science and History for two years before embarking on graduate studies in 1976. Executive Director John R. Preston (no relation) and Curator of Natural Science Edward F. Pembleton provided inspiration and guidance at the Museum of Science and History. Charles Preston was also influenced significantly by a chance meeting with and subsequent informal tutelage by George H. Lowery, Jr. at Louisiana State University during fall of 1975. During subsequent master's and doctoral work under Douglas A. James at the University of Arkansas, Fayetteville, Preston became a graduate assistant to Curator of Zoology Nancy G. McCartney at the University of Arkansas Museum (1977-1982). He received the first James A. Scholtz Award for curatorial service from the University of Arkansas Museum in 1978, and earned the Aubrey E. Harvey Award for Graduate Research Achievement from the University of Arkansas chapter of Sigma Xi in 1981. Upon receiving the doctorate in 1982, Preston left the Museum and Fayetteville campus to join the faculty at the University of Arkansas at Little Rock, initially as a Visiting Assistant Professor. He subsequently secured a tenure-track appointment as Assistant Professor of Biological Sciences, with ancillary curatorial responsibilities in the departmental museum.

After being promoted to Associate Professor and earning tenure in 1989, Preston resigned his post in Little Rock to assume the position of Curator of Ornithology at the Denver Museum of Natural History in January 1990. He was given the additional responsibility as Chairman of the Department of Zoology in August of the same year. His major objectives at Denver were to strengthen holdings from the southern Rocky Mountains and Great Plains, computerize all specimen records, encourage and facilitate increased use of collections by students and outside researchers, and expand field research and public outreach in zoology and conservation biology.

Between 1990 and 1994, ornithology collections management was assisted by a collections manager (Richard S. Peigler 1990-1993, William G. Alther 1993-), who also assisted with insect and mammal collections management. Financial support for the ornithology program was bolstered in 1994 by a bequest from the estate of John and Nina Bouslog. Among other things, the Bouslog bequest has been used to fund a half-time graduate curatorial assistant in ornithology each year beginning in 1994. Frank J. Hein (1994-1997, University of Denver) and Kirstie M. Bay (1998- , University of Colorado at Denver) were the first two recipients of the Bouslog Graduate Assistantship in Ornithology. In addition to these two, Preston served as advisor or co-advisor for nine masters theses and one doctoral dissertation at three universities between 1990 and 1998. Carl E. Bock (University of Colorado, Boulder), Diana F. Tomback (University of Colorado Denver), and Milton Robinson (Denver University) supported Preston's adjunct faculty appointments and co-advised several graduate students during this period.

By May 1998 records of all bird skins and skeletons in the Denver Museum of Natural History collection were computerized. Between 1990 and 1998, approximately 2000 specimens from the Rocky Mountain/Great Plains region were added to the collection to help fill existing gaps in the primary focus region. Current holdings include approximately 42,000 bird skins, 500 skeletons (including 100–150 combination skin/skeleton specimens), and 6500 egg sets. The scope of the collection is worldwide, reflecting early exhibits-driven collecting expeditions and exchanges, but the greatest geographic research strengths are from arctic Alaska and the southern Rocky Mountain/Great Plains region.

Major research projects initiated in ornithology in the 1990s have focused primarily on bird distribution and reproductive success in relation to habitat and landscape composition. A long-term study of bird and mammal communities at Rocky Mountain Arsenal National Wildlife Refuge, initiated in 1991 (e.g., Beane and Preston 1994, Preston et al. 1994, Preston and Beane 1996), attracted significant funding from the U.S. Army and helped forge a fruitful partnership between the Museum and the U.S. Fish and Wildlife Service.

Subsequently, the focus of the ornithology field research program shifted to the Comanche and Cimarron National Grasslands in southeastern Colorado and southwestern Kansas. In 1996, Preston (Fig. 11) and his students initiated a study of *Buteo* breeding distribution and population dynamics, funded in part by the U.S. Forest Service and the W. M. B. Berger Foundation. This project has evolved into the Comanche Grassland Ecosystem Project, encompassing a variety of studies directed by Department of Zoology curators. It has been aided greatly by the establishment of a Geographic Information Systems laboratory at the Museum, proposed and encouraged chiefly by paleontologist Russell W. Graham and Preston.

The Berger Foundation support of the Comanche Grassland Ecosystem Project was used to fund educational initiatives providing hands-on field research experiences for children and young adults. This program was inspired by another Museum ornithology project initiated by Preston and supported in part by the Berger Foundation: the Dinosaur Ridge Raptor Migration Station. The Station, established in 1990, is a cooperative project sponsored by the Denver Museum of Natural History Department of Zoology, the Colorado Bird Observatory, and Jefferson County Department of Open Space. Each year, between March and early May, staff and volunteers from these organizations monitor and record migrating raptors at Dinosaur Ridge, approximately 16 km southwest of downtown Denver, and provide educational programs for area students, families, and other visitors. Data are compiled and analyzed annually by staff in the Department of Zoology, and reported to the Hawk Migration Association of North America.

Fig. 11. Charles R. Preston, seen here on the Comanche National Grassland, Baca County, Colorado, 1997, served as Curator of Ornithology and Chairman of the Department of Zoology between 1990 and 1998. He left to establish a new natural history museum at the Buffalo Bill Historical Center, Cody, Wyoming. Courtesy Denver Museum of Natural History Photo Archives.

Another major activity in the Museum's ornithology program in recent years was the Colorado Breeding Bird Atlas Project. The Department of Zoology provided the Atlas Project with office space and services beginning in 1988. Various staff members, students, and volunteers in the Department helped conduct fieldwork, and contributed species accounts and introductory chapters for the atlas volume (e.g., Preston and Kingery

1998). Departmental Associate Hugh E. Kingery acted as Atlas Project Coordinator and editor for the resulting book (Kingery 1998).

In May 1998, Preston resigned his position at the Denver Museum of Natural History to become Vice President and Curator of Natural History at the Buffalo Bill Historical Center, Cody, Wyoming, and to guide the mission, design and development of the Center's new Draper Museum of Natural History. To date he maintains an affiliation with the Denver Museum as an adjunct Research Associate in the Department of Zoology.

THE PATH AHEAD

The last two decades have seen a resurgence in ornithological activity at the Denver Museum of Natural History. The bird collection remains a significant national resource and one of the great strengths of the Museum. Data from the collections, finally available in electronic format and with improved geographic coding, are more useful to researchers than ever before. Field initiatives, such as the Comanche Grassland Ecosystem Project and the Dinosaur Ridge Raptor Migration Station, offer opportunities for continuing long-term research and innovative educational programming focusing on birds. The location of the Museum between the Great Plains and the southern Rocky Mountains encourages some exciting, collections- and field-based inquiries related to avian distribution, speciation, and morphological variation along elevational gradients. Strong bonds have been developed between the Museum's ornithology program and local universities, providing exceptional opportunities for museum staff, university students, and faculty.

Due to increasing public awareness of the impact of human activities on our environment, the opportunity for natural history museums to broaden our audiences and fulfill our roles as centers of exploration, documentation, and informal public education have never been greater. To be successful, our institutions must strive to be as dynamic as the phenomena we address and the audiences we serve. The Denver Museum of Natural History is poised to build on its hundred-year tradition and contribute significantly to science and society in the 21st century.

ACKNOWLEDGMENTS

We are grateful to Liz Clancy for her able assistance locating and interpreting archival photographs. This account is a tribute to the vision, abilities, diligence, and accomplishments of colleagues who preceded us at the Denver Museum of Natural History, and a challenge to those who will follow.

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5

Mountaintop Science: The History of Conservation Ornithology at Hawk Mountain Sanctuary

Keith L. Bildstein [1] *and Robert A. Compton* [2]

ABSTRACT.—Hawk Mountain Sanctuary, the world's first refuge for birds of prey, was founded in 1934 by Rosalie Edge to stop the shooting of thousands of migrating raptors along the Kittatinny Ridge in the central Appalachian Mountains of eastern Pennsylvania, 120 kilometers northwest of Philadelphia. Today, the Sanctuary maintains the longest and most complete record of raptor migration in the world. Hawk Mountain's early ornithological highlights focus on Maurice Broun's attempts to document the magnitude, species composition, and timing of raptor migration at the site. Broun's observations of a substantial Golden Eagle (*Aquila chrysaetos*) flight in eastern Pennsylvania (39 birds in 1934 alone), together with the rapid passage of Broad-winged Hawks (*Buteo platypterus*) in mid-to-late September and the relationship between the passage of cold fronts and the magnitude of visible migration at the site, rank among the Sanctuary's many significant contributions to ornithology. In midcentury, Hawk Mountain's long-term counts of migrating raptors were used by conservationists, including Rachel Carson, to document pesticide era declines in birds such as Bald Eagles (*Haliaeetus leucocephalus*) and Peregrine Falcons (*Falco peregrinus*). In the 1980s and 1990s, the Sanctuary solidified its role as a global information hub for raptor migration science, as well as an international mentor to raptor conservationists, with a successful international internship program and a global migration watch-site registry known as *Hawks Aloft Worldwide*. Recently, university-trained, professional ornithologists, working together with volunteer citizen scientists attracted to the site, have increased substantially Hawk Mountain's contributions to the ornithological, ecological, and conservation literature. Although ornithology at Hawk Mountain has changed over the years, Sanctuary efforts continue to focus on the central themes of long-term monitoring and ornithology in service to conservation biology.

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Pennsylvania 19529;
[2] 972 Valley Road, Mertztown, Pennsylvania 19539-8822.

Hawk watching along the ridgetops of the central Appalachian Mountains of eastern Pennsylvania was serious business in the late 1920s and early 1930s. Most raptors were considered vermin. Vermin were to be killed, and the sooner the better. Shooting along the region's northeast-to-southwest oriented ridges appears to have begun around the time of World War I (Anonymous 1941). By 1932, thousands of raptors were being shot at accessible vantage-points along the region's southeastern-most promontory, the Kittatinny Ridge, a corduroy hill that runs largely uninterrupted from southeastern New York, through northern New Jersey, and eastern Pennsylvania, almost to the border with Maryland. Nowhere along the ridge was shooting more popular than at a series of rocky outcrops above Drehersville, Pennsylvania (Sutton 1928a, 1931; Broun 1949) (Fig. 1).

Although some of the gunners traveled from as far as Philadelphia, most were local coal miners and farmers who gathered along the ridgetops on weekends, particularly Sundays—which for many was their only day off—to do their civic duty and shoot as many hawks, eagles, and falcons as possible. Although reports of similar shooting galleries in southern New Jersey had raised the ire of conservationists in the early 1920s (Stone 1922), events above Drehersville in the late 1920s to the early 1930s galvanized a small but determined band of raptor protectionists, who helped create Hawk Mountain Sanctuary, the world's first refuge for birds of prey (Broun 1949).

Over the years, Hawk Mountain Sanctuary has grown to become a global leader in raptor conservation (Broun 1949, Council on Environmental Quality 1984, Bildstein et al. 1993, Bildstein 1998, Bildstein et al. 1998). Ornithology at the site, some of it conducted before Hawk Mountain Sanctuary was founded in 1934, continues to provide an essential knowledge base for many of the Sanctuary's conservation efforts.

PRE-SANCTUARY OBSERVATIONS

An irruptive migration of Northern Goshawks (*Accipiter gentilis*) in the winters of 1926-27 and 1927-28 (Sutton 1931) did more than evacuate large numbers of accipiters from the boreal forests of eastern Canada. The invasion triggered a series of events that eventually led to the creation of the world's first refuge for birds of prey.

Northern Goshawks were considered vicious killers in the early part of the 20th Century, even by many conservationists and ornithologists (e.g., Fuertes 1920, Sutton 1928b, Hornaday 1931). The movements of these birds into Pennsylvania during the winters of 1926-27 and 1927-28 was not

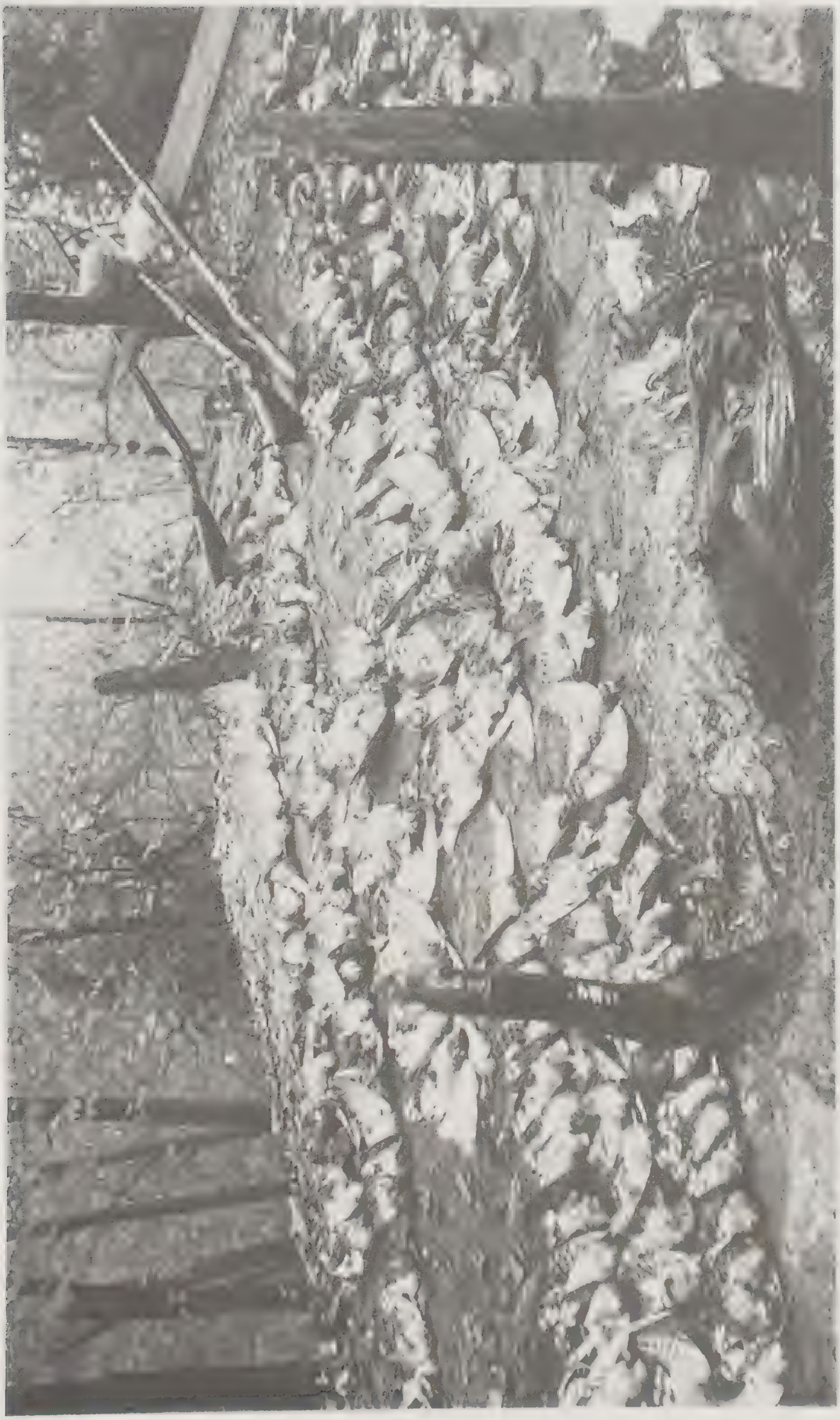

Fig. 1. Shot hawks gathered by Richard Pough, Harold Pough, William Jeans, and Henry Collins, one Sunday in late September 1932. (Photo by Harold Pough, Hawk Mountain Sanctuary Archives.)

a welcome event (Gerstell 1937). In eastern Pennsylvania, rural inhabitants along the Kittatinny Ridge, or Blue Mountain, 120 km northwest of Philadelphia, reported the "unfortunate" phenomenon to the local game protector, Archie C. Smith. Smith, in turn, alerted state ornithologist, George Miksch Sutton. The two visited the ridge two miles above Drehersville, Pennsylvania, on 19 and 20 October 1927. The site, which had been a popular blueberry (*Vaccinium* spp.) and huckleberry (*Gaylussacia baccata*) bald following a wood-burning-locomotive-sparked fire in 1898, had attracted the attention of shooters at least since the early 1920s. While there, Smith, Sutton, and their companions collected at least four goshawks and five Sharp-shinned Hawks (*Accipiter striatus*). Three days later, Smith and several shooters returned and "secured, in a remarkably short time, a total of ninety sharp-shins, sixteen Goshawks, eleven Cooper's Hawks (*Accipiter cooperi*)[sic], thirty-two Red-tailed Hawks (*Buteo borealis borealis*)[sic], and two Duck Hawks (*Rhynchodon peregrinus anatum*)[sic]." It is little wonder the place was known to local inhabitants as Hawk Mountain.

Sutton published his findings—including considerable information on body masses and stomach contents of Sharp-shinned Hawks, Cooper's Hawks (*Accipiter cooperii*), Northern Goshawks, Red-tailed Hawks (*Buteo jamaicensis*), and Peregrine Falcons (*Falco peregrinus*), along with data on age ratios and tail shape in accipiters—the following June (Sutton 1928a). The report, together with a second on the status of the Northern Goshawk in the state published in 1931 (Sutton 1931), had diametrically opposing effects. First, by 1929 the Pennsylvania Game Commission, for whom Sutton worked, was offering a $5 bounty on goshawks killed between 1 November and 1 May (Gerstell 1937), thereby substantially increasing the likelihood of shooting at the site. Second, the two reports drew the attention of the region's ornithological and conservation communities.

Upon reading Sutton's initial article, Earl Poole (1891-1972), then assistant director of the Reading Public Museum in Reading, Pennsylvania, 40 km south of the site, and author of *The Birds of Berks County, Pennsylvania* (Poole 1930), began visiting the mountain in 1929. Poole's observations, together with several accounts relayed to him by local gunners—including a Broad-winged Hawk (*Buteo platypterus*) flight of 2000 individuals on 22 September 1932—represents the first detailed description of raptor migration at the site (Poole 1934).

Sutton's articles also brought Philadephians Henry H. Collins, Jr., and Richard Pough to the ridge. The two confirmed and expanded Sutton's earlier descriptions of the shooting in first-hand accounts published in *The Hawk and Owl Society Bulletin* (Collins 1933) and *Bird-Lore* (Pough 1932).

Photographs of dozens of shot hawks accompanying the articles appear to have been especially effective. At the request of the Philadelphia Society for the Protection of Cruelty to Animals, State Policeman G. Barr spent three "nightmarish" days on the mountain in the autumn of 1933, watching as many as 400 shooters kill so many birds that that a "bad odor hung over the place" (Broun 1947). That same October, Pough showed slides of his photographs at a joint meeting of the Hawk and Owl, Linnaean, and National Association of Audubon societies in New York City (Fig. 1). Mabel Rosalie Barrow Edge, founder and head of the Emergency Conservation Committee (ECC), was in the audience the night Pough spoke (Fig. 2).

The following June, Edge, accompanied by Pough and her son Peter, toured the ridgetop above Drehersville with local realtor, Gordon Reed. Shortly thereafter, Edge leased the 565 ha that was to become Hawk Mountain Sanctuary for one year at $500. (By the mid 1990s, the Sanctuary had grown to 900 ha.) A final purchase price was set at $3500 (P. Edge 1974). That August, Edge engaged Maurice Broun as "ornithologist-in-charge" of the new Sanctuary (Fig. 3). With little money in the ECC treasury available for his salary, Broun "generously put all such considerations aside" and traveled to Drehersville with his wife, Irma, on 10 September. The two spent three nights in a leaky Schaumbochs cottage (Fig. 4) near the top of the mountain before finding more suitable lodging in Drehersville (Broun 1949).

DOCUMENTING THE FLIGHT

Maurice Broun (1906-1979).—Born in New York City of Romanian parents and orphaned at age two, Broun and his adoptive parents moved to Boston shortly thereafter. Maurice Broun became interested in birds at age 13, when a group of bird watchers in Boston Commons showed him a Magnolia Warbler (*Dendroica magnolia*). After finishing high school, Broun worked with Edward Forbush, and later helped John B. May edit the third volume of Forbush's *Birds of Massachusetts and other New England States* (Forbush 1929). Broun authored several of the work's species accounts, including those for Lawrence's Warbler (*Vermivora chrysoptera* x *pinus*) and Black-capped Chickadee (*Parus atricapillus*).

Maurice Broun was working for Oliver L. Austin, Sr., at Austin's banding station on Cape Cod in Wellfleet, Massachusetts, when Rosalie Edge visited the site in March of 1934. Broun, who had acquired his first pair of real binoculars—8x Zeiss—in May of 1934, enthusiastically accepted Edge's

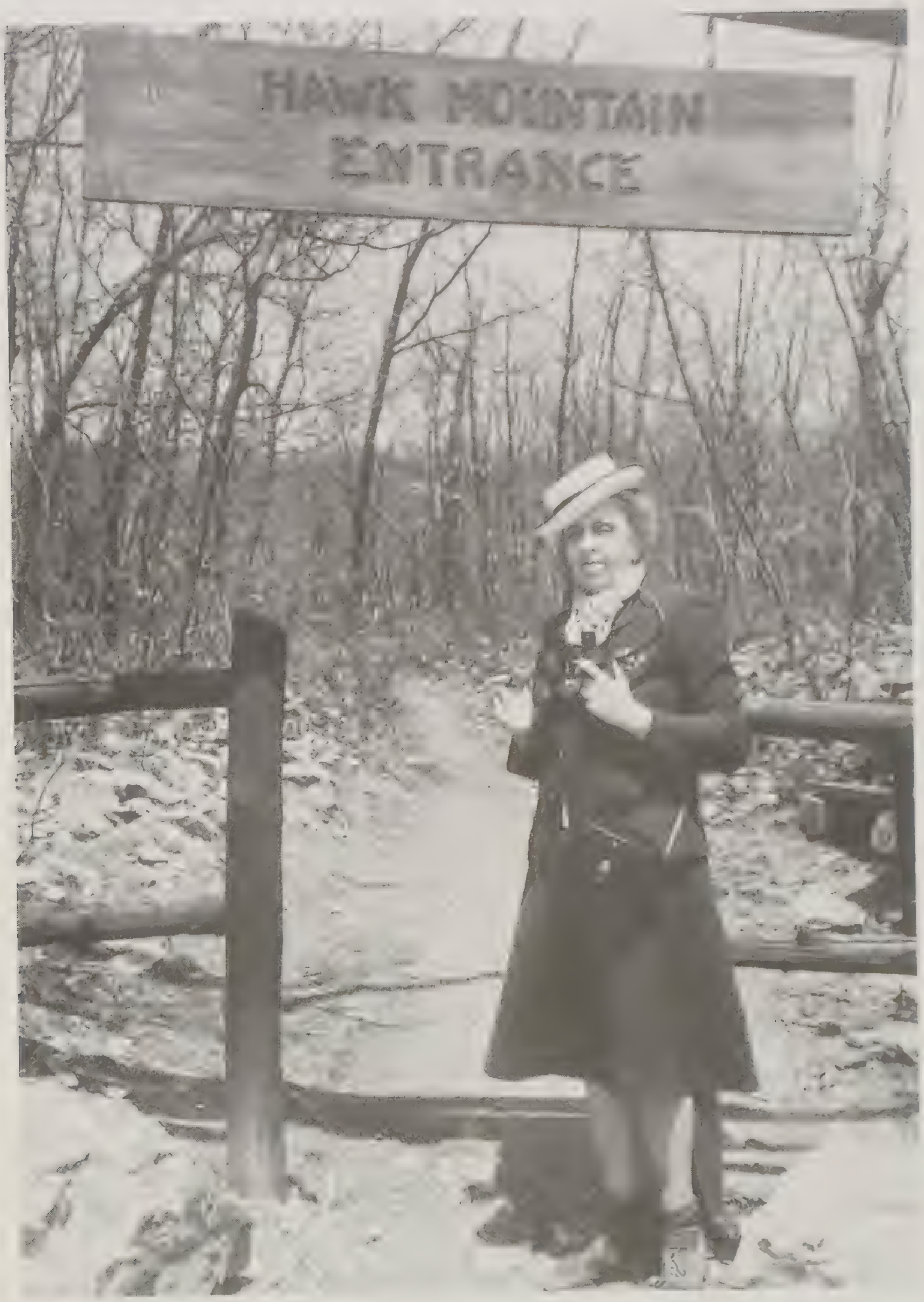

Fig. 2. Rosalie Barrow Edge (1877-1962) at the trailhead to the North Lookout at Hawk Mountain Sanctuary. Edge founded Hawk Mountain Sanctuary in 1934, and Hawk Mountain Sanctuary Association in 1938. (Photo by Maurice Broun, Hawk Mountain Sanctuary archives.)

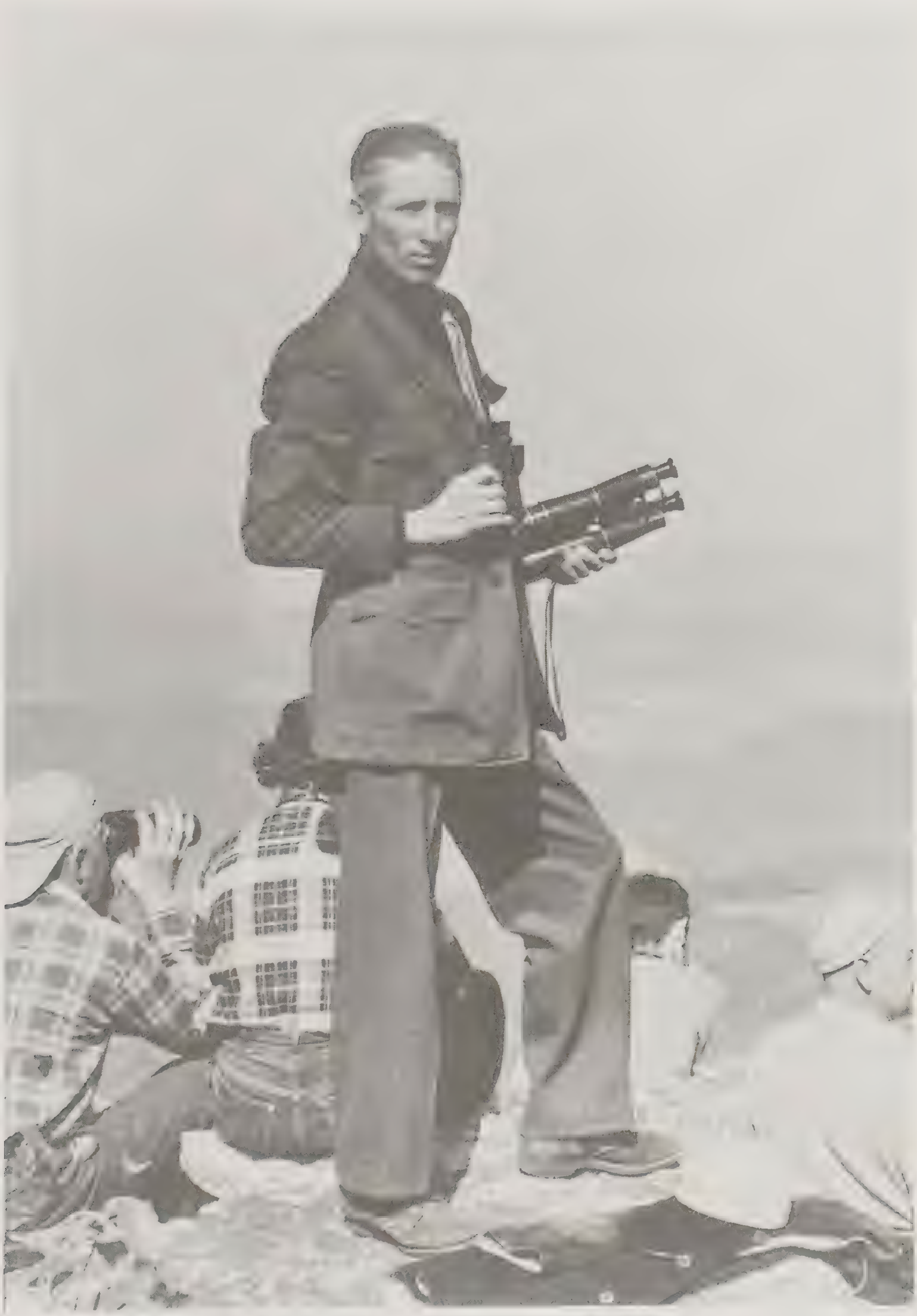

Fig. 3. Maurice Broun atop Observation Rocks (North Lookout). Broun began counting migrating raptors at Hawk Mountain on 30 September 1934. (Photo by Maurice Broun, Hawk Mountain Sanctuary Archives.)

offer later that summer to take a position as the newly established Sanctuary's ornithologist-in-charge. His title later was changed to curator.

Maurice Broun spent most of September 1934 posting the Sanctuary's boundaries and informing local inhabitants about the site's new status as a refuge for birds of prey (Broun 1949) (Fig. 5). He saw his first migrating raptors, "some fifty birds, includ[ing] three bald eagles [*Haliaeetus leucocephalus*], three peregrine falcons, a few broadwings and sharpshins..." while replacing vandalized no-trespassing signs along the road during his

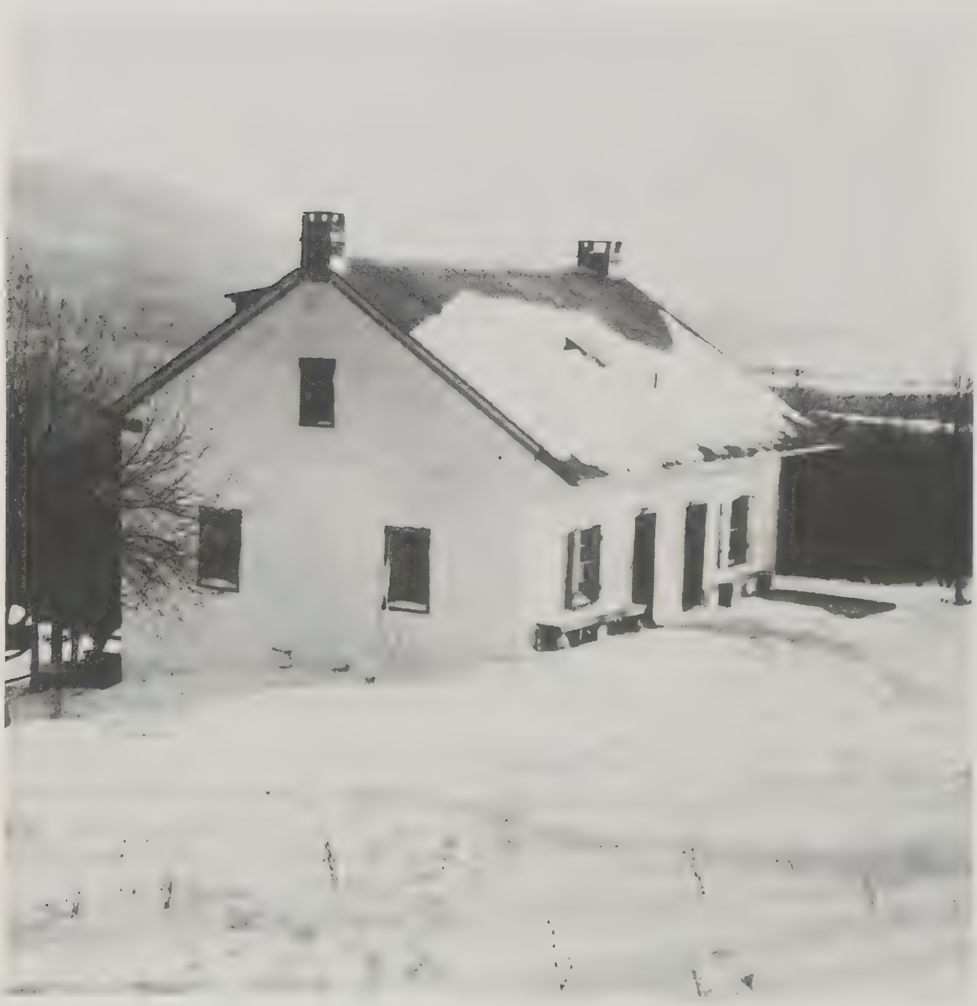

Fig. 4. Schaumbochs cottage was acquired by the Sanctuary in 1938. The cottage served as Maurice and Irma Broun's residence until 1966, and Sanctuary "headquarters" until the visitor center was built in 1970. (Hawk Mountain Sanctuary Archives.)

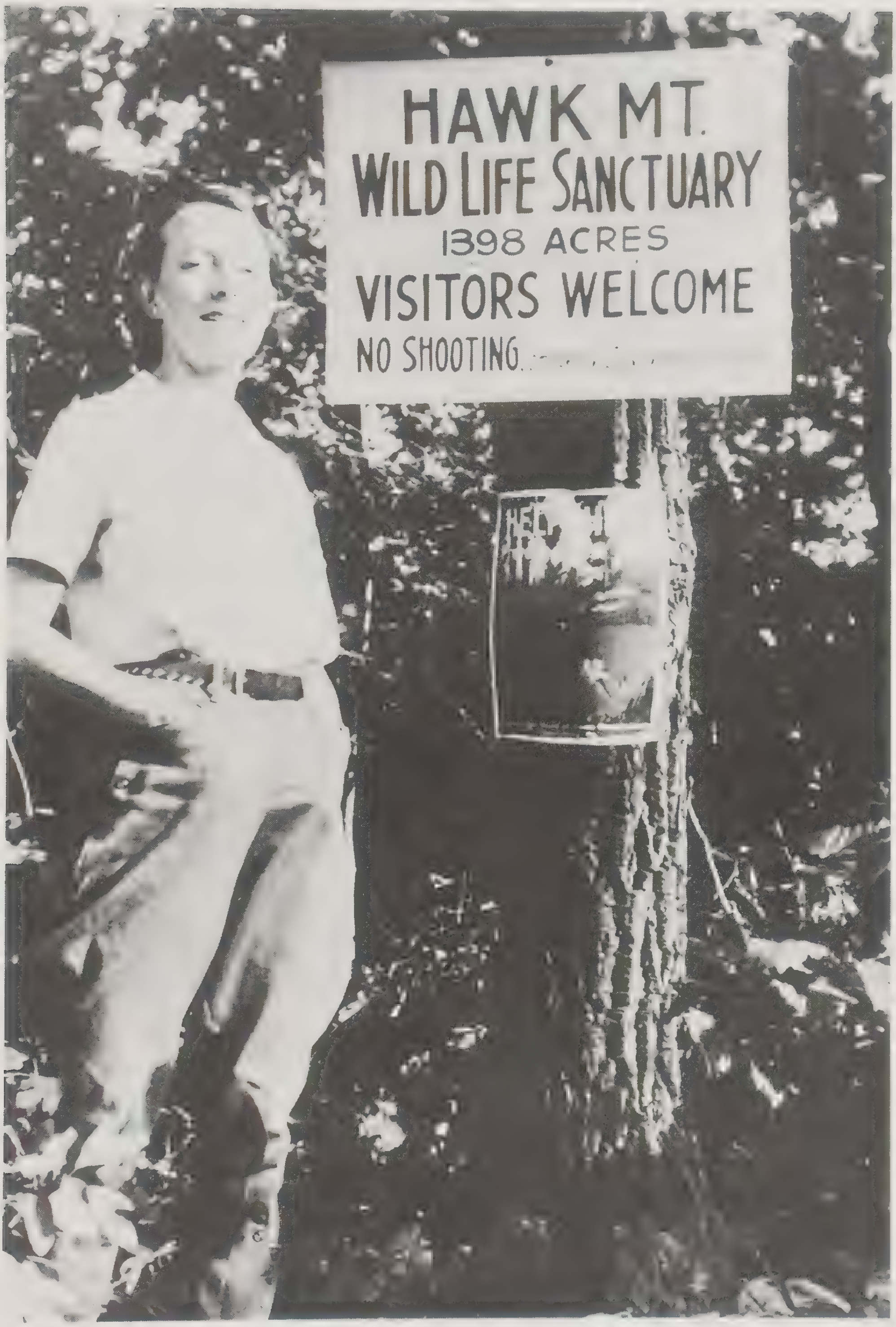

Fig. 5. Irma Broun, the Sanctuary's "keeper of the gate" in 1935. (Photo by Maurice Broun, Hawk Mountain Archives.)

first week on the Mountain. On 30 September 1934, he began counting migrating raptors from what was then called Observation Rocks (Fig. 6), something he would continue to do on a regular basis for the next 32 years. His journal for the day summarizes his first-day's observations:

> "We were on the rocks, recorded but 128 hawks, considered an extremely low figure: 102 Sharp-shins, 2 Cooper's, 1 Duck [Hawk], 15 Turkey Vultures, 1 Bald Eagle, 1 Osprey, 2 Red-tails, 2 Broad-wings, and 2 Marsh Hawks."

Although Broun had initiated the counts primarily to document the magnitude of the flight to enlist financial support for conservation efforts at the Sanctuary (Broun 1935a,b), it quickly became apparent that a series of annual counts would enable the Sanctuary to monitor regional populations of the birds (Broun 1939). By its second year of operation, counts of migrating raptors had become a fixed feature of Sanctuary fieldwork (Broun 1949).

Like Poole (1934) before him, Broun (1935b) was quick to recognize the relationship between weather, particularly the passage of what are now called cold fronts—and which Broun characterized at the time as "cold, but not necessarily clear day[s], immediately after rainy weather"—and great hawk flights. In that first paper, Broun also discussed potential sources of the flight, as well as its relationship with hawk migration in coastal New York and New Jersey. His greatest and most controversial initial contribution, however, was his seasonal total of 39 Golden Eagles (*Aquila chrysaetos*). The species was then considered an extremely rare straggler in eastern North America in autumn (e.g., Poole 1930), and several years would pass before the ornithological establishment fully accepted Broun's finding.

Broun summarized his first three seasons of observations in an Emergency Conservation Committee pamphlet (Broun 1936a), and his first five years of counts in the *Auk* (Broun 1939). The latter mentions the growing number of birdwatchers visiting the by then internationally renowned birding venue, as well as several aspects of the migration, including a midday "lull" in the flight (see also Poole 1934), the timing of seasonal passages of individual species, and the fact that the overwhelming majority of migrating Red-tailed Hawks were adults (Broun 1939).

Broun, who also botanized at the time (Edge 1939), published an *Index to North American Ferns* in 1938 (Broun 1938), as well as an article on fern gardening in 1936 (Broun 1936b). His next published works on bird migration—aside from annual reports to Sanctuary members initiated in 1939, one year after Rosalie Edge had created the membership-supported Hawk Mountain Sanctuary Association—were brief accounts of migrat-

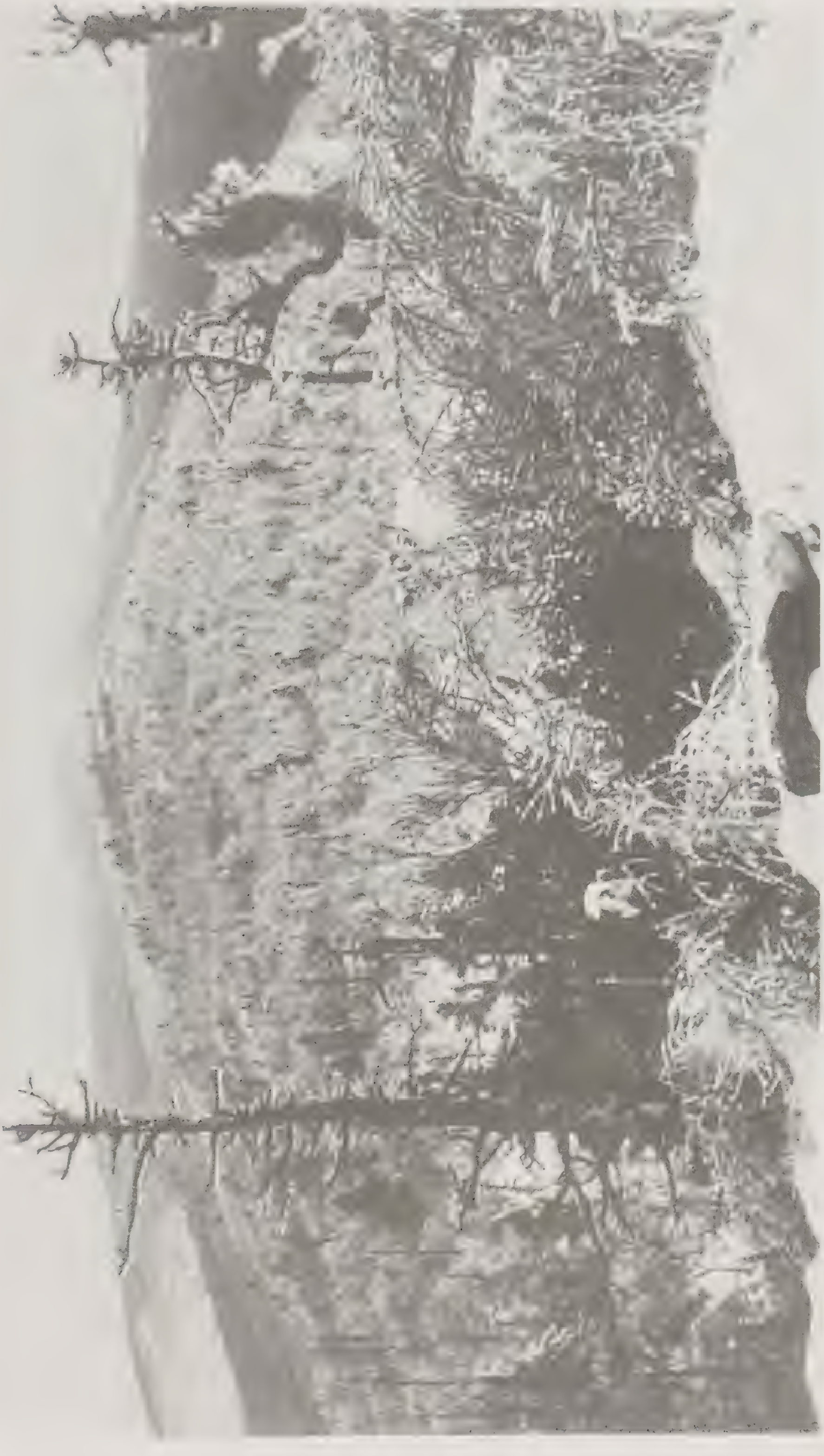

Fig. 6. The view to the east (up-ridge) from North Lookout, as seen in a 1939 Christmas card from Maurice and Irma Broun (Photo by Maurice Broun, Hawk Mountain Archives.)

ing Blue Jays (*Cyanocitta cristata*) and other non-raptors at the site (Broun 1941a,b). In 1942, he and Ben Goodwin spent six weeks on field telephones in late September-early November recording the flight speeds of 152 hawks migrating along the Kittatinny Ridge past the Sanctuary (Broun and Goodwin 1943) (Fig. 6). An accomplished photographer, Broun produced a 125-meter, 16-mm color film about Hawk Mountain in 1941, which the Sanctuary then rented for $5. In 1943-45, three years for which there was no official count, Broun served as a photographer with the U.S. Navy SeaBees in the South Pacific.

A seasonal employee before World War II, Maurice Broun was hired as a live-in, year-round Sanctuary employee in 1946. It was then that Broun and his wife, Irma, moved into the newly acquired Schaumbochs cottage on-site, where Maurice spent the next two winters documenting the early history of the Sanctuary. *Hawks Aloft: the Story of Hawk Mountain* was published in 1949. The book, which has since become a conservation classic, set the stage for the Sanctuary's entry into international raptor conservation.

Schaumbochs cottage proved to be a surprisingly great place to observe spring warbler migration. Broun had banded his first bird near the site, a Mourning Dove (*Zenaida macroura*) in 1936. Although he banded no birds in the area again until 1954, by 1963 he had banded 11,814 birds, representing 82 species, on or near the Mountain, together with 2030 at other locations. Many of the birds, including 4881 Evening Grosbeaks (*Hesperiphona vespertina*) and 6228 Dark-eyed Juncos (*Junco hyemalis*), were captured near bird feeders at Schaumbochs. Ninety-five of the 102 raptors Broun and his assistants banded during this period were American Kestrels (*Falco sparverius*), which were breeding in nestboxes the Sanctuary had placed in farmlands surrounding the site.

By the early 1950s, Hawk Mountain was hosting close to 10,000 visitors annually. With most people arriving in autumn, visitor demands forced Broun to become increasingly dependent upon volunteers and assistants to conduct the fall count. Between 1934 and 1948 Broun had conducted the count largely on his own. In the early 1950s, volunteers were conducting a quarter of the counts (Bildstein 1998). Although Alex Nagy had been hired as Assistant to the Curator in 1953, attempts to protect raptors at other shooting sites up and down the ridge, mounting correspondence, speaking engagements, and managerial responsibilities slowed the pace at which Broun contributed to the literature. His last significant contribution to the ornithological literature—a summary of his observations on the effects of cold fronts on raptor migration—was published in the *Atlantic Naturalist* in 1951, and reprinted as a Sanctuary pamphlet in 1963 (Broun 1951, 1963).

Throughout the 1940s, 50s, and 60s, the Sanctuary continued to attract growing numbers of birding enthusiasts. Roger Tory Peterson, who served on the Sanctuary Association's board from 1949 to 1962, and Guy Mountfort conceived the idea to write A field guide to the birds of Britain and Europe (Peterson et al. 1954) while visiting the Sanctuary in 1949 (Fig. 7). The Eastern Bird Banding Association held its annual meeting at the Sanctuary in the recently completed Common Room in April 1955.

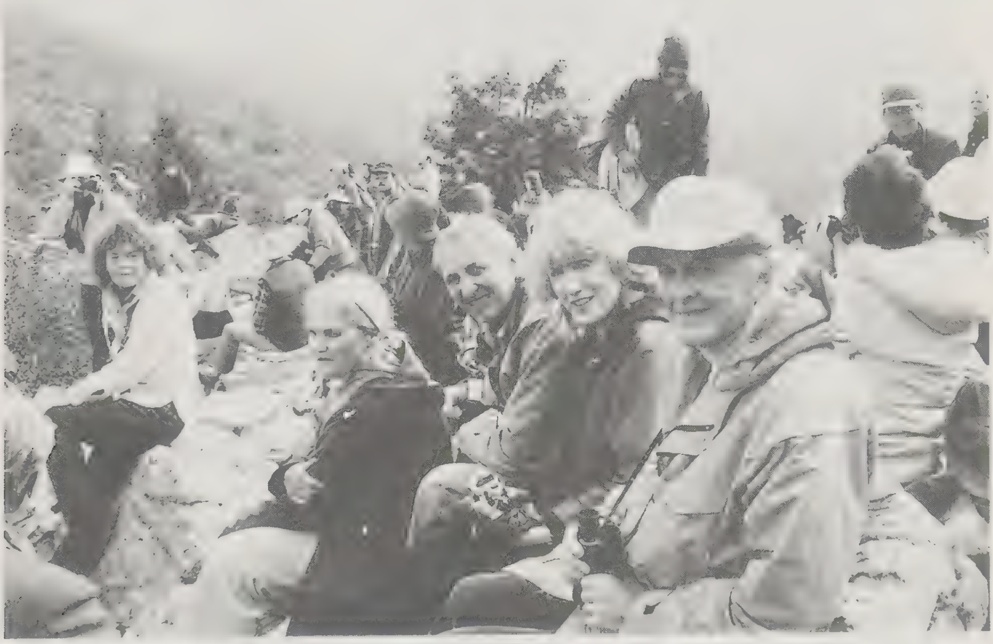

Fig. 7. Birders atop the North Lookout during the Sanctuary's 50th anniversary celebration in 1984. Dede and Howard Brokaw (then Sanctuary board member), and Ginny and Roger Tory Peterson (former Sanctuary board member), left to right. (Photo by Joe Snook, Hawk Mountain Sanctuary Archives.)

Although the 1950s and 60s saw the threat of hawk shooting along the ridge diminish substantially—the Pennsylvania Game Commission terminated the bounty on Northern Goshawks in 1951—another, new threat to raptors loomed on the horizon. As early as 1952, Maurice Broun began commenting on the substantial decline in the ratio of juvenile to adult Bald Eagles at the site. The decline, which first became apparent in the late 1940s, coincided directly with declines in the reproductive success of the species in Florida (Broley 1950, Broun 1952). Less than a decade later the Sanctuary's counts of juvenile and adult Bald Eagles were used by Rachel Carson to support her arguments for the impact of chlorinated hydrocarbons, particularly DDT, on bird populations (Carson 1962). Notably, the Sanctuary's records for the species since the mid-1970s—following bans on the widespread use of DDT in North America—have tracked a reversal in the decline, so much so, that by the late 1980s the ratio had returned to pre-World War II levels (Bildstein 1998).

Maurice Broun, who retired as Sanctuary Curator in April 1966, died on 2 October 1979, the same year Schaumbochs Cottage was added to the National Register of Historic Places.

Alexander C. Nagy (1924-1986).—Alex Nagy (Fig. 8), the Sanctuary's second curator, was born in Allentown, Pennsylvania, to Hungarian immigrants. In World War II, he attended the Merchant Marine Academy and served as an engineer on transport ships in the Mediterranean Sea and South Atlantic Ocean. After that he lived on a farm in Eckville, at the base of Hawk Mountain, with his father, Charles. A model enterprise, the Nagy farm had been one of the first in northern Berks County to use contour plowing to reduce soil erosion. In 1953, Alex Nagy joined the Sanctuary's staff as assistant to the Curator. Nagy became Curator in 1966 when Broun retired from the post.

Alex Nagy began erecting nest-boxes for American Kestrels on the family farm in the early 1950s (Nagy 1963). These early efforts represent the first in a series of Sanctuary contributions. The Sanctuary's kestrel project received a substantial boost in 1987 when Victor Apanius, a Ph.D. candidate at the University of Pennsylvania, erected 120 boxes in the area (Apanius 1991). Three additional graduate students have used the boxes for studies of kestrel ecology (Ardia and Bildstein 1997, Wiehn 1997, Wiehn et al. 1997, Rohrbaugh and Yahner 1997). By the early 1990s, Sanctuary volunteers, interns, and graduate students, particularly Sanctuary volunteers Sue and Chester J. "Bob" Robertson, were conducting almost all of the field-work and banding associated with the project.

In 1997, the Sanctuary initiated an adopt-a-kestrel-nest-box program for Pennsylvania school children; this allows students to practice real

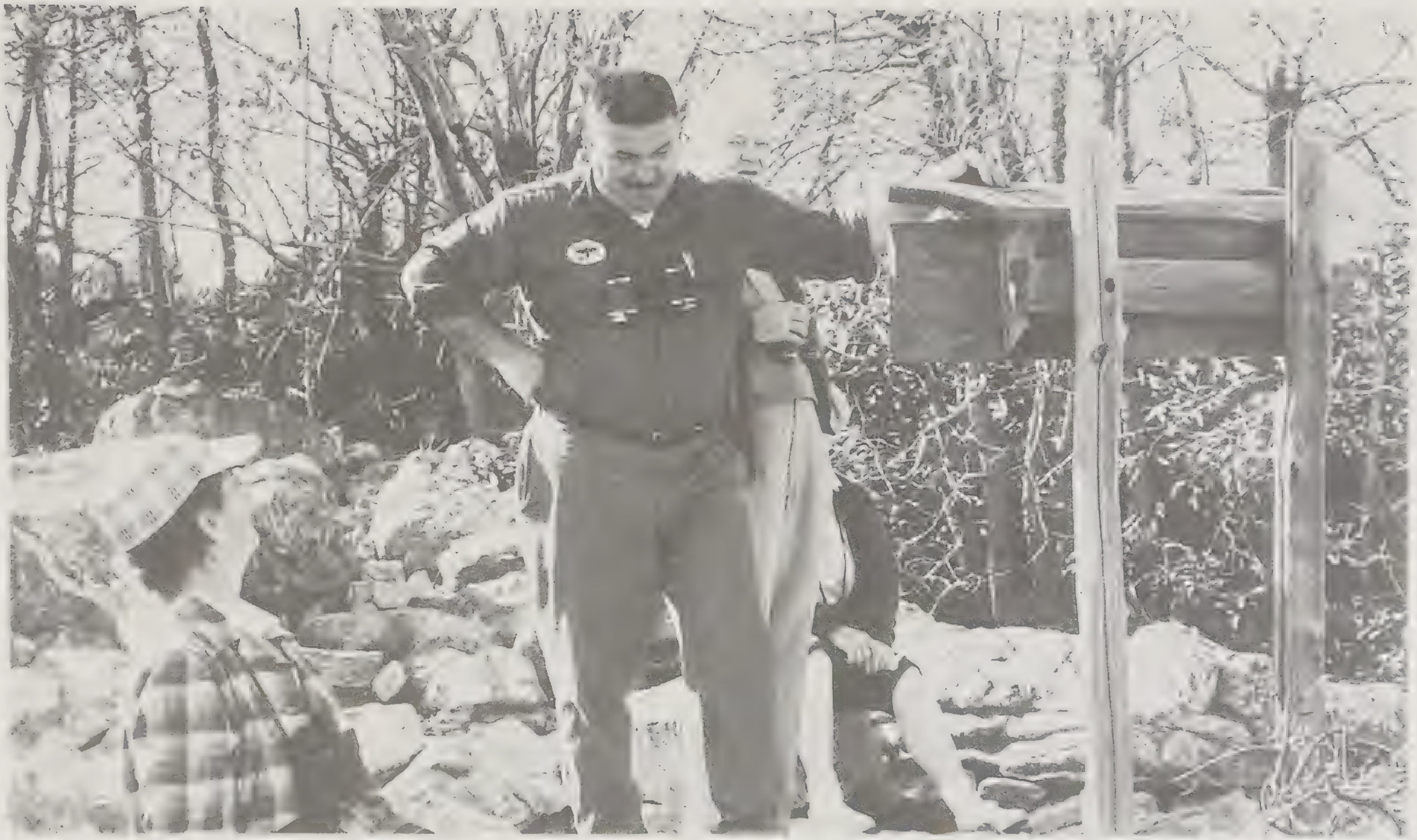

Fig. 8. Alex Nagy, the Sanctuary's second Curator, worked on Hawk Mountain's American Kestrel nest box program in the early 1950s. (Hawk Mountain Sanctuary Archives.)

wildlife biology and natural resource management, while collecting important ecology information. Today, the nest-box program Nagy began, has grown into the quintessential Sanctuary effort, with Sanctuary staff, volunteers, and interns, colleges students, and local land owners working together in practical and effective conservation biology.

Another of Nagy's significant activities involved attempting to boost migration count results by increasing the count effort to include sightings at Sanctuary lookouts in addition to the North Lookout, particularly South Lookout and Owls Head Lookout. Although this sometimes meant that birds were not counted at the North Lookout—the practice was discontinued in the late 1970s—it did produce the Sanctuary's highest single-day raptor count ever: an astounding 21,608 birds, including 21,448 Broad-winged Hawks, on 14 September 1978, approximately half of which were counted at the North Lookout.

In 1975 Nagy presented the Sanctuary's first analysis of the then 40-year hawk migration database in more than two decades at a world conference on birds of prey in Vienna, Austria (Nagy 1977).

Alex Nagy was curator until 1981, when, because of failing health, he retired to a geodesic-dome house he had built on the family farm in Eckville. He died on 24 November 1986.

EXPANDING THE SANCTUARY'S HORIZONS

James J. Brett (1940-).—Jim Brett, the Sanctuary's third Curator, was born in Shillington, Pennsylvania, 40 km south of Hawk Mountain. Brett, who grew up in a home with a worldly view that valued cultural exchange, played a central role in moving the Sanctuary from an unofficial continental center for raptor enthusiasts and conservationists into an internationally recognized center in the field of raptor conservation (Fig. 9). Brett, who became Assistant Curator in September 1971, had graduated with a B.S. in biology from then Kutztown State Teachers College in 1961 and had been teaching biology in the York, Pennsylvania, school system. He and Alex Nagy authored *Feathers in the Wind* (1973), the first real "field guide" to migrating birds of prey. Brett later revised and expanded the popular guide twice (Brett 1986, 1991). It was under Jim Brett's direction that the Sanctuary first offered "Three Saturdays at Hawk Mountain." The course, taught in conjunction with then Kutztown State College, was the first college-level offering taught entirely at the Sanctuary. Jim also was responsible for the Sanctuary's role in the formation of a California Condor (*Gymnogyps californianus*) Survival Group in 1983, and for helping to

Fig. 9. Jim Brett, the Sanctuary's third Curator, established the Hawk Mountain's international internship program in 1985. (Hawk Mountain Sanctuary Archives.)

sponsor the World Working Group on Birds of Prey and Owls' Third World Conference in Elat, Israel, in 1987. Perhaps his most significant contribution was the role he played in initiating Hawk Mountain's International Intern Program.

Although Maurice Broun had been encouraging young people to help at the Sanctuary since the late 1940s, it was not until Jim Brett arrived that a formal "internship program" began to take shape. Brett started working with local high school and college students in the Sanctuary's education programs in 1974. Within a few years the successful program was attracting regional and national candidates. In 1986 the Sanctuary welcomed its first international intern, Menachem Adar, from the Society for the Protection of Nature in Israel. By 1998, the International Intern Program had trained more than 170 young conservationists from 28 countries on six continents, many of whom are making substantial contributions in the field.

THE CURRENT PERIOD (1984-PRESENT)

As the Sanctuary's third and last curator, Jim Brett presided over one of the Sanctuary's great transitions: its move from informal mountaintop retreat for bird watchers and raptor enthusiasts, regional center for hawk protection, and informal source of guidance to raptor conservationists elsewhere, into a world-class center of raptor-migration science, conservation, and education. The end of the earlier era was punctuated by the arrival of two ornithologists, Stanley Senner in 1982 and Laurie Goodrich in 1984.

Stanley Epp Senner (1951-).—Stan Senner, the Sanctuary's first Executive Director, arrived at the Mountain in June 1982. Senner, a professionally trained migratory bird biologist, with an M.S. from the University of Alaska, Fairbanks, was hired by the Sanctuary's board to "devise general and specific programs, help raise money for them, build membership, strengthen [the Sanctuary's] role in wildlife research, and increase [its] impact on political decisions affecting wildlife and the environment" (Taylor 1982). Recognizing the value of the Sanctuary's second-growth forests as a base for long-term studies in Appalachian forest ecology, Senner nurtured Sanctuary efforts in the area, including increased use of two Breeding Bird Census and Winter Bird Survey plots, which had been surveyed and established at the site in the spring of 1982 by Seth Benz and Tom Leckey (Goodrich et al. 1998). He also hired Laurie Goodrich as the Sanctuary's first full-time research biologist.

Senner expanded the Sanctuary's national and international profile considerably, both by serving as Chair of the International Council for Bird Preservation's U.S. Section for 10 years in the late 1980s and early 1990s, and by initiating, together with Jim Brett, an international registry of important raptor migration watch-sites (Senner and Brett 1989, Bildstein et al. 1995, Bildstein and Zalles 1995, 1998). He also organized and helped edit the proceedings of a successful Sanctuary-sponsored symposium on "Raptor conservation in the next 50 years," which was held at Hawk

Mountain in October 1984 in celebration of the Sanctuary's fiftieth anniversary (Senner et al. 1986).

Laurie J. Goodrich (1955-).—Laurie Goodrich, a professionally trained ornithologist, with a M.S. in ecology from Rutgers University in New Brunswick, New Jersey, arrived at the Sanctuary in August 1984 (Fig. 10). Goodrich immediately assumed duties as coordinator of the Sanctuary's autumn migration counts, together with the responsibility of overseeing its spring migration counts, kestrel nest-boxes, Christmas Bird Counts, Breeding Bird Censuses, and Winter Bird Surveys. Laurie also helped to initiate the Sanctuary's first serious studies of songbird breeding biology. Under her direction, efforts in this area blossomed in the late 1980s and early 1990s into substantial and detailed investigations of Wood Thrush (*Hylocichla mustelina*) and Ovenbird (*Seiurus aurocapillis*) reproductive success on the Sanctuary's large contiguous forests and in a series of small second-growth woodlots in farmlands surrounding the site. The studies, several of which were conducted in association with Pennsylvania State University biologist Margaret Brittingham, have led to an impressive series of M.S. theses (Hoover 1992, Morgan 1995, Giacomo 1998) and publications (Porneluzi et al. 1993, Hoover et al. 1994, Noojibail 1995, Goodrich et al. 1998, Wilson et al. 1998). This new and exciting area of Sanctuary ornithology yielded considerable useful information on avian natural history as well as the effect of woodland size on Neotropical migrant reproductive success. The work also has provided rich insights into the value and limitations of "artificial nests" in studies of avian nesting success and—very much in line with the Sanctuary's long tradition of volunteer-collected databases (Bildstein 1998)—the use of continent-wide monitoring schemes such as the USGS's Breeding Bird Surveys and Cornell Laboratory of Ornithology's Breeding Bird Censuses in avian population biology.

Together with Senner, Goodrich also initiated a series roadside surveys of raptors in the Kempton Valley southeast of the Sanctuary. These have since become part of the Sanctuary's long-term database (Bunn et al. 1995). Goodrich also documented hummingbird migration at the site (Willimont et al. 1988), studied Great Horned Owl (*Bubo virginianus*) diets (Wink et al. 1987, Goodrich and Senner 1988), and prepared the Broad-winged Hawk species account for *The Birds of North America* (Goodrich et al. 1996).

At the same time that the Sanctuary was broadening the scope of its research efforts into forest songbird ecology, computer technology had reached a stage that enabled the Sanctuary to think seriously about more thorough analyses of its long-term raptor-migration database, which by

Fig. 10. Laurie J. Goodrich, the Sanctuary's senior naturalist, conducted Hawk Mountain's first biological inventory in 1996-1999. (Hawk Mountain Sanctuary Archives.)

the mid 1980s was more than half a century long. Initial efforts in the area involved having a data-entry service, Biometrics Incorporated of Bethlehem, Pennsylvania, begin key-punching the Sanctuary's daily (1934-) and hourly (1966-) counts onto computer cards. In 1984, Sanctuary board member and Muhlenberg College Professor of Biology, Daniel Klem, Jr., offered the services of the college's Office of Information and Technology to complete the process. Working together with Senner, Goodrich, and Seth Benz, Klem helped design the fields for data entry and oversaw the tedious process of data validation and analysis. By the early 1990s each year's data were being entered and validated at Muhlenberg College within a year of their collection. The Sanctuary bolstered its ability to take advantage of this now reasonably accessible resource by hiring

James Bednarz to fill the newly created position of Director of Higher Education and Research.

James C. Bednarz (1950-).—Jim Bednarz, the Sanctuary's first Ph.D.-level scientist and its first Director of Research, arrived at the Sanctuary in 1987 (Fig. 11). Bednarz, who in 1978 had been the initial recipient of the Sanctuary's now annual student research award, had studied nesting Red-shouldered (*Buteo lineatus*) and Red-tailed hawks for his M.S. at Iowa State University, and Harris' Hawk (*Parabuteo uncinatus*) social behavior for his Ph.D. at the University of New Mexico. The position Bednarz filled was made possible by a three-year grant from The J. N. Pew, Jr., Charitable Trust, together with several generous gifts from Sanctuary members. Jim had been hired to "expand and improve" Sanctuary research, and to increase opportunities for higher education at the Sanctuary (Anonymous 1987). Although Bednarz left the Sanctuary in 1990, he was remarkably successful in both areas. Working closely with Senner, Goodrich, and Klem, Bednarz helped oversee the first detailed analysis of the Sanctuary's long-term database. The results of that effort (Bednarz et al. 1990), clearly revealed the value of the Sanctuary's long-term database as a barometer of raptor population trends throughout the middle half of the 20th Century. Bednarz also was responsible for collecting information needed to make the Sanctuary more readily available to academic researchers, overall establishing an enviable record for his immediate successor.

Keith L. Bildstein (1950-).—Keith Bildstein's initial visit to Hawk Mountain as a Muhlenberg College undergraduate in 1969 inspired him to study raptors as a graduate student at The Ohio State University in the mid-1970s. He became Hawk Mountain Sanctuary Director of Research in July 1992 (Fig. 12). Bildstein had first come to appreciate raptors in the early 1960s while watching Cooper's Hawks pursue his father's homing pigeons in northern New Jersey. Trained under Thomas Grubb and Frances Hamerstrom, he had earlier studied raptors in Wisconsin, Ohio, Florida, and South Carolina. Bildstein immediately assumed responsibility for managing the Sanctuary's long-term migration data, transferring the database from the computer center at Muhlenberg College to the Sanctuary, where, together with Sanctuary intern Paul Allen, he began validating and analyzing it (Allen et al. 1996, Viverette et al. 1996, Bildstein 1998). Bildstein also directed the Raptor Migration Watchsite Registry project (Senner and Brett 1989), which, in 1993 was renamed *Hawks Aloft Worldwide*. By 1998 this global conservation initiative had identified 384 raptor migration watchsites in more than 80 countries worldwide (Bildstein et al. 1993, Bildstein and

Fig. 11. Jim Bednarz, the Sanctuary's first Ph.D. biologist and Director of Research helped elevate research ornithology at Hawk Mountain in the late 1980s. (Hawk Mountain Sanctuary Archives.)

Fig. 12. Keith L. Bildstein helped solidify the Sanctuary's position as an international center for raptor migration science and conservation in the early 1990s. (Photo by Chuck Dressner.)

Zalles 1995, 1998, Bildstein et al. 1995, Zalles and Bildstein 1995). Bildstein also helped prepare the Northern Harrier (*Circus cyaneus*) and Sharp-shinned Hawk species accounts for *The Birds of North America* (MacWhirter and Bildstein 1996, Bildstein and Meyer in press), and in 1998, together with colleagues at the National Audubon Society and the Cornell Lab of Ornithology, he helped organize a worldwide web-based *International Broad-winged Hawk Survey* that tracked—in near-live time—the movements of Broad-winged Hawks from their breeding grounds in eastern Canada and the northeastern United States, to wintering areas in Central and South America (Bildstein 1999).

Today, Hawk Mountain Sanctuary is an international leader in raptor conservation, particularly in Central and Latin America (Bildstein and Zalles 1998), where it is collaborating with Pronatura Veracruz and HawkWatch International, at the world's most significant raptor migration watchsite in Veracruz, Mexico (Bildstein et al. 1995, Maxwell 1996, Bildstein and Zalles

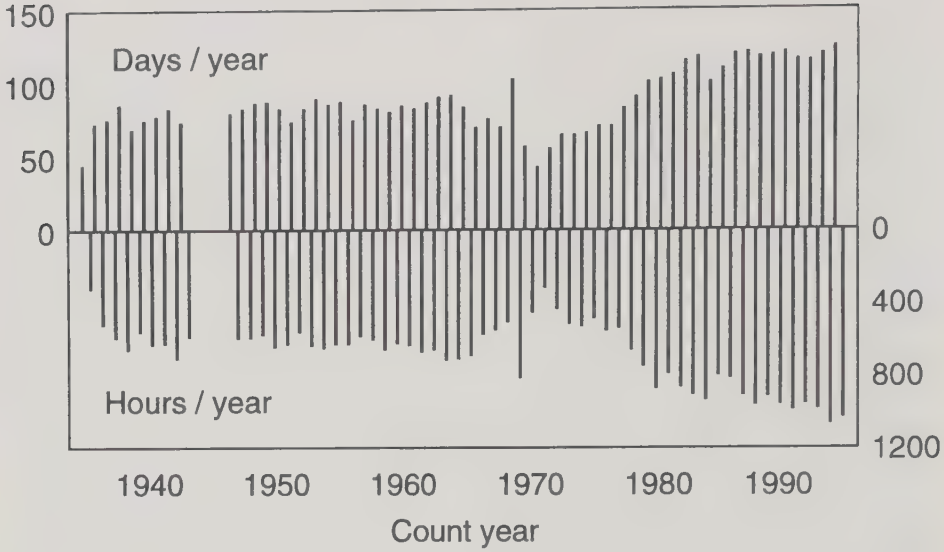

Fig. 13. North Lookout count efforts at Hawk Mountain Sanctuary, 1934-1995. No counts were made in 1943-1945 while Maurice Broun served with the U.S. Navy in the South Pacific. The decrease in count effort in the late 1960s and early 1970s is the result of moving the count among Sanctuary lookouts, principally North, South, and Owl's Head lookouts, depending upon daily weather conditions.

1998). By mid-1998, *Hawks Aloft Worldwide* was working together with more than 800 international cooperators in maintaining an active roster of close to 400 watchsites, 105 of which record or have the potential to record more than 10,000 migrants annually. In early 1998, Sanctuary authors, with the help of conservationists on six continents, published the first conservation status report for the world's 222 species of mainly or completely tropical raptors (Bildstein et al. 1998).

In sum, throughout its 65-year history, conservation ornithology at Hawk Mountain has focused on the central themes of long-term monitoring (Fig. 13) and ornithology in service to conservation biology (Fig. 14). Although each of the personalities involved has lent his or her own distinguishing characteristics to these efforts, the Sanctuary has remained faithful to the intentions of its founder, Rosalie Edge, who viewed Hawk Mountain as a place with "a duty to its human visitors no less important than its duty to its migratory and resident wildlife" (Edge 1939). That Hawk Mountain Sanctuary welcomed 80,000 visitors a year in the mid-1990s, while its staff members were asked to organize the scientific programs for the 2nd Raptor Research Foundation (RRF) International meeting in Urbino

Fig. 14. Joseph Taylor, left, and Peter Edge, right, at the Sanctuary Common Room in the early 1960s. Taylor, who was instrumental in founding the Hawk Migration Association of North America in 1974, was Sanctuary President from 1967 to 1992. Peter Edge, Rosalie Edge's son, and her successor as Sanctuary Association Board President, upon her death in 1962, was with his mother when she first visited the Sanctuary in June 1934. (Hawk Mountain Sanctuary Archives.)

Italy in 1996, and the 3rd RRF International meeting in Trebon, Czech Republic in 1999, as well as host the 25th Anniversary meeting of the Hawk Migration Association of North America in 2000, is indicative of this dual role.

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A History of the Western Foundation of Vertebrate Zoology, 1956-1994

Lloyd F. Kiff [1]

Abstract.—The Western Foundation of Vertebrate Zoology (WFVZ) was founded in 1956 by Ed Harrison, a Los Angeles businessman, egg collector, and bird photographer. Over the next 12 years Harrison added several other important collections to his own private holdings of bird eggs, nests, and study skins, and the WFVZ initiated a publications program. Lloyd Kiff was hired as the WFVZ curator in 1968 and became director in 1975. The 1970s-1980s were a time of aggressive specimen acquisition by the WFVZ, mostly through the incorporation of other collections, but also by sending collecting expeditions to tropical countries on four continents. The egg collection grew to nearly 180,000 sets, and the nest collection increased to over 25,000 specimens; both are probably the largest in the world. The bird study skin collection, comprised mostly of specimens from tropical regions, tripled in size to 53,000 specimens. Other programs for research, publications, and conservation were gradually expanded, and the WFVZ cosponsored several ornithological meetings of international importance. Since its inception, the WFVZ has provided assistance to about 4000 research projects in the form of written response to data requests, specimen loans, and by making its collections available to visiting researchers.

Over a period of several years, the WFVZ attempted to affiliate with other institutions, including the Santa Barbara Museum of Natural History and the Natural History Museum of Los Angeles County, but no alliance worked out. When the WFVZ gained control of the assets of the Bleitz Wildlife Foundation (BWF) in 1991, it became possible for the foundation to assure its own independence; the BWF was subsumed by the WFVZ in March 1993. A large warehouse-office building was purchased in Camarillo, Ventura County, California in February 1992, and the entire

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WFVZ operation was moved from West Los Angeles to the new quarters later that year. The WFVZ is one of the few North American institutions devoted specifically to the acquisition, integration, and preservation of avian collections.

Among the organizations treated in the "Contributions" volumes, the Western Foundation of Vertebrate Zoology (WFVZ) occupies a unique position. On the one hand, it is a Victorian relic, on the other, a model for the future of systematics collections, reflecting the differing objectives of the individuals most closely associated with the organization. During its relatively brief history, it has touched the lives of many North American ornithologists.

THE EARLY YEARS (1956-1968)

The foundation was established in 1956 by Ed N. Harrison (1914-), a Los Angeles businessman, wildlife photographer, and relentless collector of bird skins, eggs, nests, and natural history books. Frustrated by the increasing difficulty of obtaining agency permits to maintain and add to his private collection, Harrison took the advice of his attorney and formed the WFVZ, reasoning that an organization would have less trouble acquiring scientific collecting permits than an individual. The name of the organization was broadly worded to accommodate the collecting of all vertebrates, principally in the western United States, but the focus of the foundation eventually narrowed to mostly ornithological pursuits.

Harrison persuaded several other associates, C. V. Duff, J. R. "Bill" Pemberton (1884-1968), Mrs. Frances Roberts (d. 1971), and William "Bill" Sheffler (1893-1967), all now deceased, to serve as founding Board members. All of them later figured prominently in a fierce battle for the control of the Cooper Ornithological Society (COS) during the early 1960s, and they comprised the majority of the amateur ornithologist/businessman faction that sought, among other changes, to popularize *The Condor*. Sheffler, Pemberton, and Duff made only modest financial contributions to the fledgling organization, as they evidently viewed the WFVZ as Harrison's personal venture from the start. Pemberton did, however, donate the residue of his Patagonian and North American egg collections to the WFVZ. He was Harrison's mentor during the latter's teenage years, and perhaps he would have been more active in WFVZ affairs had he not been at the end of his productive years when the Foundation was formed.

It was the considerable energies and funding of Harrison, with the support of his childhood tutor and later partner in wildlife photography,

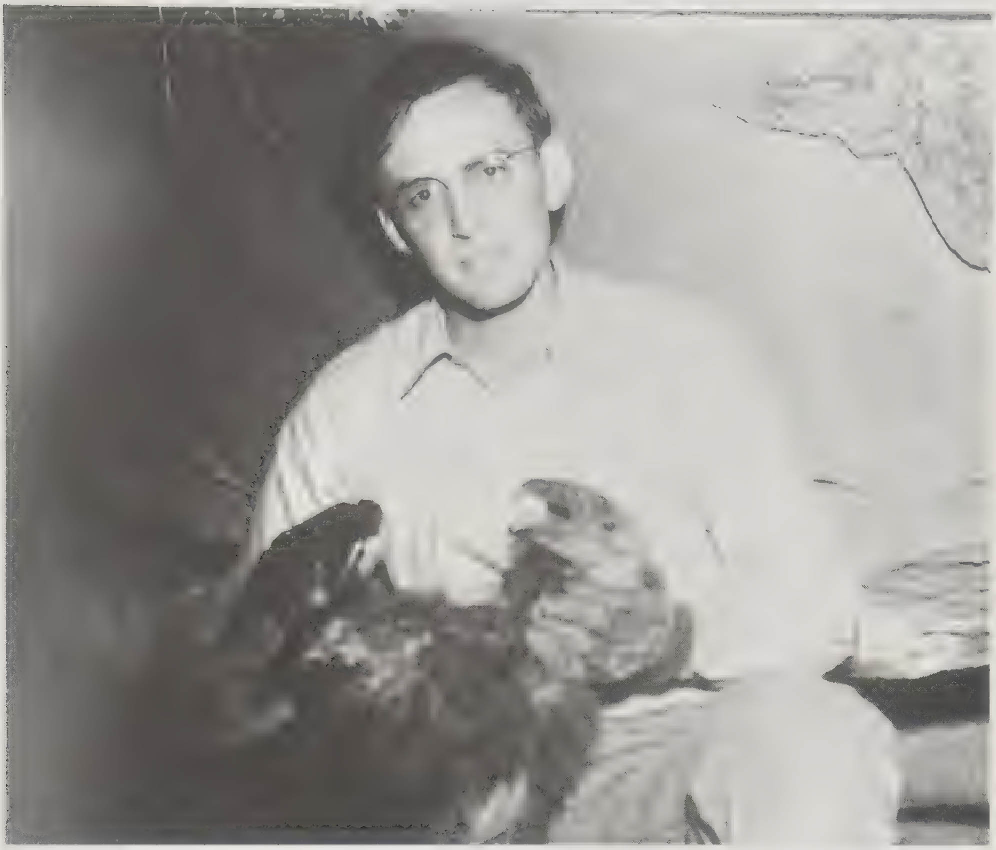

Fig. 1. Ed Harrison holding a California Condor chick. Photograph by Carl B. Koford in 1939.

Mrs. Roberts, that got the foundation off the ground. Harrison channeled his efforts into gathering existing bird, egg, and mammal collections from elderly collectors, or their heirs, and he provided support on an almost annual basis for WFVZ-sponsored collecting expeditions to various tropical countries, particularly Mexico. Meanwhile, the wheelchair-bound Roberts attempted to provide some sense of order to the growing collections as she set about cataloguing specimen data from her nearby apartment.

One of the principal reasons Harrison formed the WFVZ was his passion to continue to collect and maintain control over his collections. He was not willing to turn over his specimens to the Los Angeles County Museum of Natural History (LACMNH) or the San Diego Natural History Museum (SDNHM), despite his long tenure on the governing boards of both institutions. To him, this would have meant the end of his hobby and

Fig. 2. J. R. "Bill" Pemberton. Photograph by Ed Harrison in 1958.

thus the principal basis of his interest in natural history. When it came to collecting and collections, Sheffler was of the same personality type as Harrison. Both were *amassers*, not scholarly sorts who pored nightly over their specimens, endlessly sorting and cataloguing them; rather, it was the act of acquisition that possessed them. Indeed, Harrison has frequently described himself as a "collector of collections."

Harrison was also concerned—rightly, as later events showed—about the future of existing bird egg collections in North America. Collecting bird eggs, i.e., their empty shells, was a popular hobby in North America from the mid-19th century to about 1940, when gradual changes in public attitude led to increasingly rigorous legal restrictions on such activities and to the eventual demise of "oology" as a quasi-legal hobby in North America by the 1960s. At the time the WFVZ was founded, most major natural history museums were no longer interested in adding heirloom egg collections to their holdings, even at a good price, and many important collections were in desperate need of an appropriate repository. Eggs were out of style in ornithological circles, and the once-respected oological community was viewed as a bunch of archaic stamp collectors. The WFVZ was formed in part to serve as such a global depository for egg collections, much in the fashion originally envisioned by William Leon Dawson, whose "Museum of Comparative Oology" of the 1920s was eventually transformed into the present-day Santa Barbara Museum of Natural History.

The validity of this concept appealed over the years to well-intentioned heirs and administrators of other institutions with unwanted egg collections. As opportunities had arisen, Harrison had been amassing collections over the years, including parts or all of the collections of the Denver Museum of Natural History, Sir Charles Belcher, John G. Tyler, George Willett, and various smaller collections. Altogether, including the many specimens he took personally in California from the 1930s through the 1960s, including the fruits of several Pemberton-supported expeditions to coastal and mainland Mexico, Harrison contributed approximately 11,000 egg sets, 2000 nests, and 1747 bird study skins to the WFVZ shortly after its founding. He also brought the huge (12,000-set) Griffing Bancroft egg collection, which had been loaned to him for his lifetime by the San Diego Natural History Museum, into the WFVZ. Following protracted negotiations with the IRS, he also obtained a legal tax deduction for these gifts, thus establishing an important precedent that facilitated the later donation of important vertebrate collections by others to the WFVZ and other museums for tax advantages.

Between 1956 and 1992, the foundation collections were physically located in a substantial two-story museum building behind Harrison's home in the upscale Brentwood section of Los Angeles. For most of this period, the foundation business office was located in Harrison's 20-story office building in Westwood Village, near the campus of the University of California at Los Angeles. From the early 1970s to 1992 the WFVZ nest collection, a photography lab, and other foundation holdings were located in the sub-basement of the office building.

Despite his membership on the Board of Governors of the Los Angeles County Museum of Natural History, Sheffler, like Harrison, had continued to maintain personal natural history collections of skins, eggs, and nests. It had been more or less assumed by the LACMNH that Sheffler would even-

Fig. 3. William Sheffler and Bat Falcon in 1947.

tually deposit these holdings at that institution, but Harrison was ever hopeful that they would come to the WFVZ. Much to the surprise of the Los Angeles ornithological community, however, a smooth-talking Southerner, George Lowery, persuaded Sheffler to donate his collections of bird and mammal skins to the rapidly growing Museum of Zoology at Louisiana State University (LSU), purportedly with the hint that Sheffler might receive an honorary Ph.D. from the university. The donor and/or the idea died, however, before such a degree was actually awarded. After Sheffler's death in 1968, it was discovered that he had inexplicably bequeathed the rest of his collection, bird eggs and nests, to his granddaughter, an English major with little interest in birds or oology. Commendably, and with considerable urging from Harrison, the bemused Sheffler family soon agreed to the transfer of the collection to the WFVZ.

This important holding, which, incredibly, had been stored in a greenhouse (a conservator's worst nightmare!), not only contained important egg and nest specimens collected by Sheffler on expeditions to Sonora and Chihuahua, Mexico, and Churchill, Manitoba, but also the personal collections of other amateur and professional ornithologists, many of them prominent COS members, including Wright M. Pierce, W. Lee Chambers, Ray Densmore, Donald R. Dickey, Lawrence M. Huey, Alphonse and Antonin Jay, A. J. van Rossem (El Salvador), and part of the G. Frean Morcom collection. Altogether, Sheffler's holdings included over 4000 egg sets and over 300 nests.

Jack von Bloeker (d. 1991), another member of the mutinous COS block and a former graduate student of Joseph Grinnell, joined the WFVZ Board in the early 1960s and, with Harrison's encouragement and support, became the first editor of the WFVZ publications. Three separate series, "Monographs, "Proceedings," and "Occasional Papers," in descending order of detail and dimensions, were brought into being. Most of the early publications were on Mexican vertebrates (e.g., Schaldach 1963), reporting the results of various collecting expeditions sent there by Harrison and Sheffler. Harrison pushed the modest new publications tirelessly in the early years, providing them gratis to virtually any taker and urging friendly ornithologists to publish favorable reviews of them in the bird journals. The WFVZ publications gained overnight respect with the publication of Joe Marshall's important monograph on North American screech-owl systematics (Marshall 1967), which still serves as the primary basis for the present AOU Check-list (1983) species-level treatment of the group.

The reputation of the WFVZ was given a further considerable boost in 1963 with the addition of Dr. Jean Delacour (1890-1985) to the Board of Trustees. Delacour, then the Director of the Los Angeles County Museum of Natural History, was the world's foremost aviculturist and a renowned figure in global bird conservation and ornithological research. His willingness to join the WFVZ Board was viewed by many as an important endorsement of the scientific value of the otherwise amateur venture and also called its existence to the attention of the international ornithological community. Even so, Harrison freely admitted that Delacour joined the WFVZ Board reluctantly, grumbling that he couldn't "let down a good friend." Yet, nearly 30 years later, the foundation was the principal beneficiary of Delacour's will.

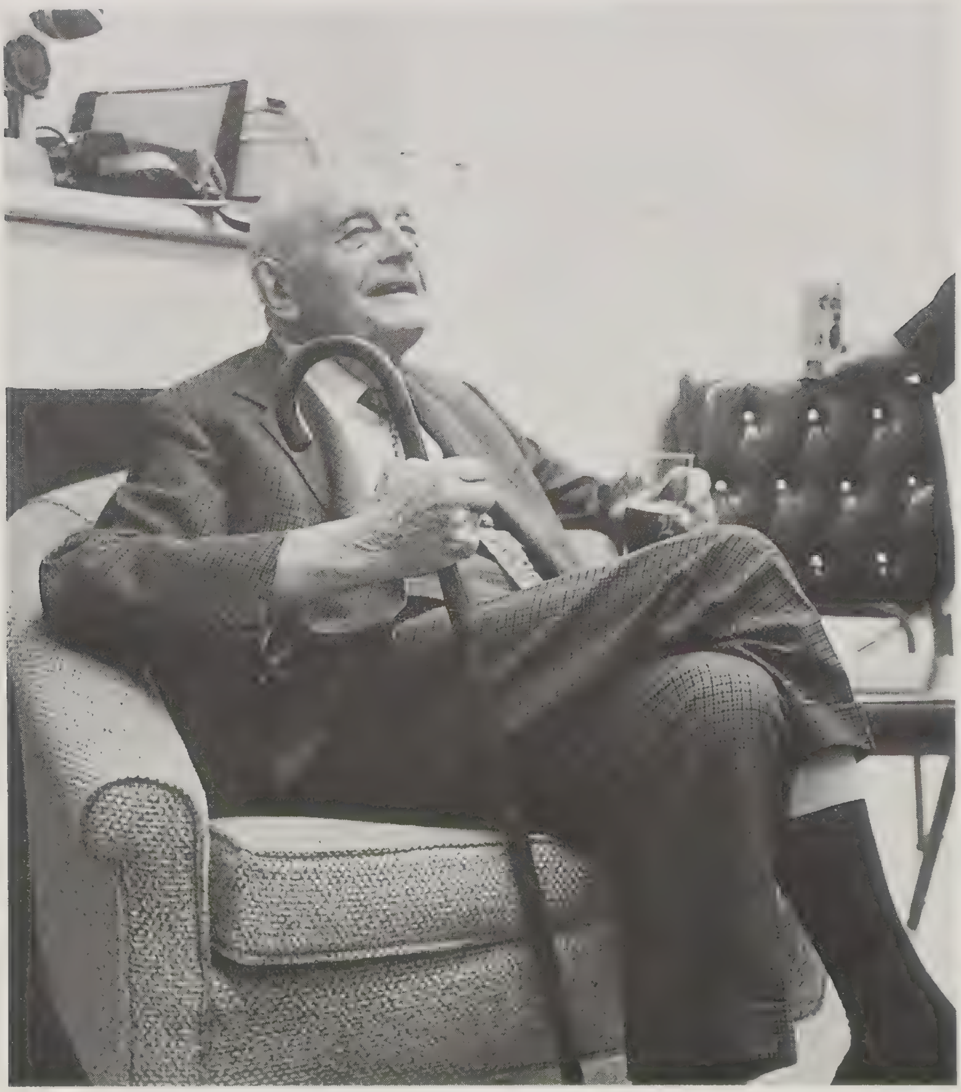

Fig. 4. Jean Delacour holding court at the Western Foundation. Photograph by Sam Sumida in 1977.

Early collecting expeditions.—Between 1956 to the late 1960s, with funding from Harrison, the WFVZ supported collecting expeditions to various parts of Mexico under the direction of Joe T. Marshall, Jr. and Allan R. Phillips (Sonora, Sinaloa, and Chiapas), William J. Schaldach, Jr. (Colima and Jalisco), Alfred Gardner (Chiapas), Robert D. Ohmart (Sinaloa), and J. Stuart Rowley (Morelos and Oaxaca). Some of the earlier trips were cooperative ventures between Sheffler and Harrison, and the specimens were split according to their respective contributions, with the Harrison portion going to the WFVZ, and Sheffler's eventually ending up at LSU. In aggregate, the collections resulting from these expeditions are among the most important Mexican avian collections in existence.

Harrison and Sheffler also hired M. A. Carriker, Jr., a resident of Popayan, Colombia, to collect specimens in that country between 1959 and 1964, and nearly 3000 bird skins were obtained from him. Again, the collections were split between the sponsors, sometimes with not-so-friendly arguments over who would receive single examples of certain species, and with occasional letters to Carriker admonishing him and his wife to refrain from collecting so many drably colored furnariids and flycatchers instead of more brightly colored tanagers, toucans, and trogons.

Building upon the earlier Mexican experience, the WFVZ embarked in 1964 on a joint venture with the California Academy of Sciences to field vertebrate collecting expeditions to the Mexican State of Oaxaca under the direction of J. Stuart Rowley (1907-1968) and Wendell Durrant with the participation of Warren Rook, Ronald Galley, Ciro B. Gonzales and several others as collectors. Approximately 4000 bird study skins were obtained on these trips and divided between the WFVZ and the Academy; an additional several hundred mammal specimens were eventually deposited at the LACMNH. A lifelong oologist, Rowley was also extremely interested in the breeding habits of Mexican birds, and two WFVZ "Proceedings" (Rowley 1966, 1984) resulted from his Oaxaca findings. He also described several new subspecies of passerines from Oaxaca (Rowley 1968). This collaboration between the WFVZ and the Cal Academy might have continued indefinitely, but for the shocking death of Rowley, probably as the result of foul play, in Oaxaca in early May 1968.

Other field work funded by Harrison through WFVZ auspices during the 1960s included several egg-collecting trips to Alaska by Sidney B. Peyton (1892-1978), a local citrus farmer, condor expert, egg collector, and longtime Cooper Ornithological Society member who joined the WFVZ Board of Directors in the mid-1960s. For several years, Peyton drove annually to Alaska in an old Plymouth sedan with several hundred thousand miles on it and spent the brief Alaskan breeding season collecting eggs with his son, Leonard J. Peyton, a member of the University of Alaska faculty. Even now, Alaska remains a poorly worked state oologically, and the Peytons added a number of unique sets to the holdings of North American museums. Throughout the early 1960s the WFVZ supported intermittent bird skin collecting in several East African countries by John Williams, Andrew Williams, and Robert M. Glen; several of these projects were jointly funded with the LACMNH, where most of the specimens were deposited.

With partial WFVZ support, Richard Crossin, then Joe Marshall's graduate student at the University of Arizona, conducted a study of the life history of the Tufted Jay *(Cyanocorax dickeyi)*, later published by the WFVZ, accompanied by a lovely color plate by Don Eckelberry (Crossin 1967). Field studies on the breeding biology of the Red Knot *(Calidris canutus)* at Thule, Greenland, and Ellesmere Island by William Hobson (1911-1982), an Irish physician who was then head of medical staff training for the World Health Organization, led to another WFVZ *Proceedings* with the Russian ornithologist, Vladimir Flint (Hobson and Flint 1972).

Collection acquisition.— While his collectors were at work in the field, Harrison was hard at work during the 1960s adding established collections, mostly of eggs, to the foundation's holdings. From California, the most important were those of George Brem (Gilroy), Dudley S. DeGroot (San Diego), Walter B. Sampson (Stockton), Lawrence Stevens (Santa Barbara), Fred Truesdale (Shandon), and Charles Thompson (Paso Robles), the latter collection being "rescued" by Delacour and Harrison from its unlikely landing place, the anthropologically-oriented Southwest Museum in Los Angeles.

The Sampson collection was unusually extensive, having been gathered from most major regions of the world. It was also accompanied by an exceptional ornithological library which included many of the fine 19th century monographs. Both the collection and library had been moved by Harrison to the WFVZ while Sampson was still alive, but following his death, it was learned that Sampson had actually bequeathed the collection to the COS. Since the COS did not maintain a library and since the membership had scant interest in owning an egg collection, no matter how wonderfully extensive, a quick deal was arranged by Harrison and Thomas Howell, as a representative of the society, to leave both the collection and the library at the WFVZ in return for the sum of $1500 (for the library, the eggs being free), and this was paid off in several annual installments.

William H. Behle arranged for the transfer of important portions of the University of Utah egg collection to the foundation in 1958 and 1965, and Robert T. Orr agreed in 1967 to exchange the Stanford University egg collection, recently obtained by the California Academy of Sciences, to the WFVZ for a reference collection of North American bird eggs. The J. Eugene Law collection was obtained from his widow, Laura Law Bailey, who had the distinction of being the widow of two prominent North American oologists, including also the outspoken Harold H. Bailey, of Rockbridge Alum Springs, Virginia. A third of the A. W. Johnson, Sr., egg collection, rich in northern California and Palearctic raptor specimens, was purchased from his son, A. W. Johnson, Jr., well known for his contributions to Chilean ornithology (Johnson 1965-1967).

The three most important egg collections obtained by the WFVZ in the 1960s were those of Col. L. R. "Lobo" Wolfe (1891-1989), Maj. William Maitland Congreve (1883-1967), and John R. Cruttenden (1915-1956). Wolfe was a career U.S. Army officer who amassed an unparalleled collection of falconiform eggs as he moved from post to post around the world. Although an amateur, through his publications (e.g., Wolfe 1938) he was regarded as a legitimate authority on the group. Congreve was the editor of the British journal *The Oologists' Record* through its best decades, and his impeccable collection of eggs from the British Isles and the Mediterranean region contained many exceptional rarities and oologically delicious abnormalities. The sale of his eggs to Harrison was arranged by Dr. William Hobson, who, curiously, also brokered a deal between Harrison and the Quincy, Illinois family of the late John R. Cruttenden for the purchase of his exceptional collection of North American eggs. Cruttenden, an insurance man and avid oologist, died at the young age of 41 years, but he had already managed to purchase all or major portions of several of the great collections made earlier in the century, including those of Edward Arnold and John Lewis Childs. Cruttenden had also added important specimens from his own collecting ventures to Churchill, Manitoba, and throughout the Midwest.

By 1968, the WFVZ was rapidly becoming the most important depository for egg collections in North America. At about 30,000 sets, it had become larger in size than even the huge collection amassed separately by another collector of collections, Wilson C. Hanna (1883-1982), of Colton, California, who had been Harrison's main competition for several decades. The WFVZ holdings also included over 18,000 bird skins and important collections of mammal skins and bird nests. The study skin collection had been organized to some extent by J. Stuart Rowley in the interstices between his Oaxaca expeditions, and he was considered to be the WFVZ curator in a somewhat informal sense. However, for the most part, the egg collections remained in their original packing boxes or cabinets, just as they had been moved into the WFVZ collections building behind Ed Harrison's home.

THE GROWTH PERIOD (1968-1988)

Through the intervention (and outright insistence) of Thomas Howell, my major professor at UCLA, I was hired by Ed Harrison in June 1968, shortly after Rowley's death, to organize the WFVZ collections. At this time,

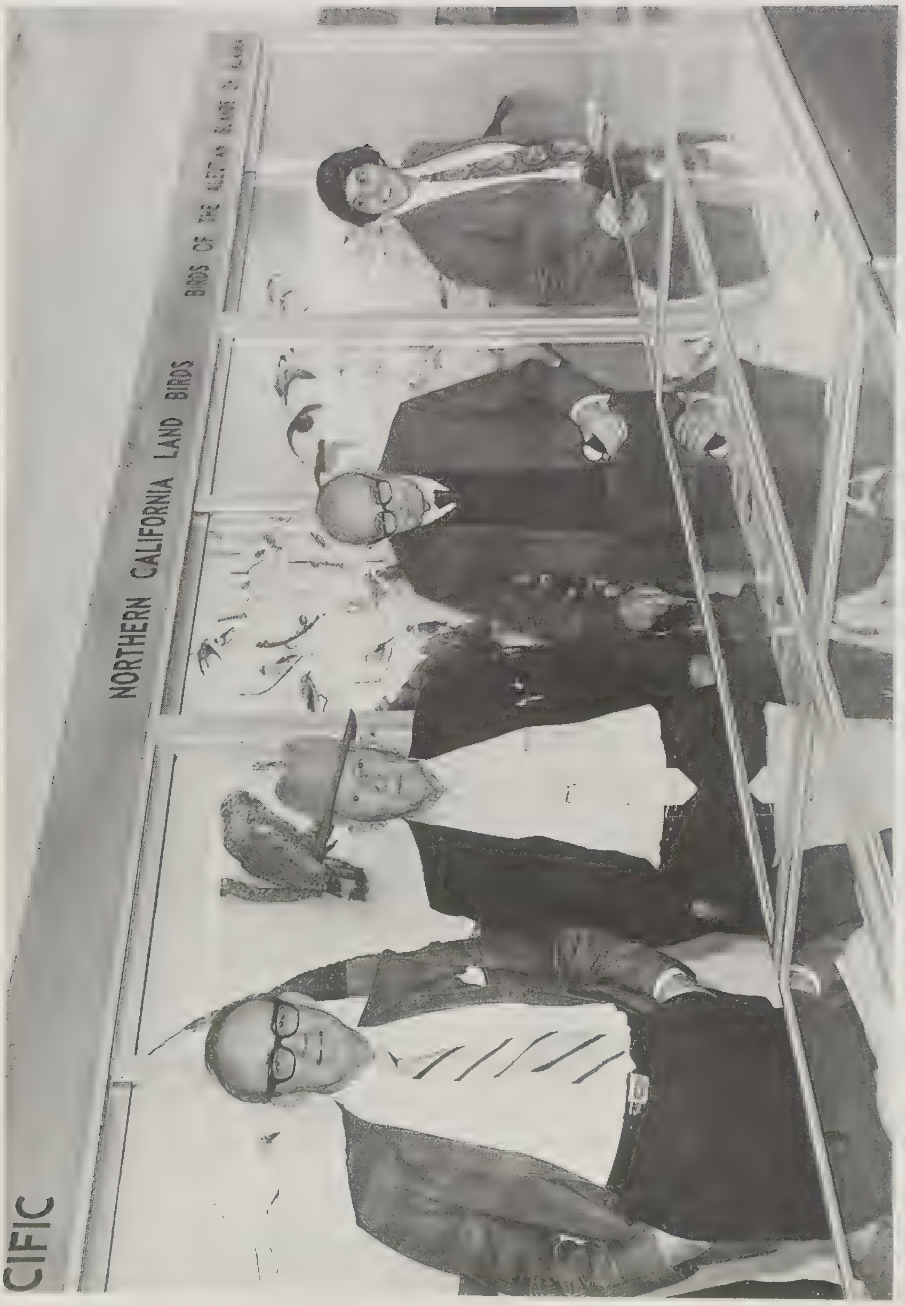

Fig. 5. Left to right: Ed Harrison, Wilson Hanna, Jean Delacour, and Lloyd Kiff in Hanna's collection at the San Bernardino County Museum, Colton, California. Photograph by Raymond Quigley in the early 1970s.

there was still a good deal of mistrust of the WFVZ by the scientific community, particularly on the University of California campuses, owing to residual hard feelings from the recent battle for the control of the Cooper Ornithological Society. Furthermore, some museum curators resented the continued existence of private natural history collections and ridiculed the notion that the WFVZ was an actual organization. For my part, though, I was delighted to become involved in organizing such an important collection, since museum work had been my passion since childhood. For several years, I was the only WFVZ employee, and I took advantage of my solitude to place the collections in synoptic order for the first time.

Howell was mainly concerned about the welfare of the study skins, rather than the egg and nest specimens, and his only advice on the latter was that "maybe you can find something useful to do with all those eggs." At the beginning, my position was evidently considered to be a part-time arrangement, since my starting "salary" was only $50 per month. By the end of the summer, after a series of 70-hour weeks, I was formally appointed as the WFVZ curator, and my salary was raised to $400 per month for full-time service. Nevertheless, even finding this amount on a regular basis was often a financial hardship for Harrison and my wife, Julie, who had become Harrison's personal secretary and *de facto* business manager of the WFVZ in the summer of 1968.

In 1969, the WFVZ Board of Directors was changed from a small group of socially prominent friends of Harrison, whose interest in the WFVZ was only nominal, to a larger body of internationally prominent ornithologists, including Herbert Friedmann (1900-1987), Joseph J. Hickey (1907-1993), Thomas R. Howell, L. Richard Mewaldt (d. 1990), Robert T. Orr (1908-1994), F. Gary Stiles (1942-), Jack C. Von Bloeker, Jr., John G. Williams (1913-1997), and Col. L. R. Wolfe. They were never involved in day-to-day management of the WFVZ, and the first (and only) meeting of this Board did not occur until 17 years later. However, they lent their support to the WFVZ in various other ways, and their names and Delacour's on the Foundation letterhead conveyed a sense of respectability that was often helpful in persuading other institutions to transfer their egg collections to the WFVZ. In addition, there was a tacit understanding that the Board would see that the WFVZ collections were appropriately placed in the event of some mishap to the day-to-day managers. Ironically, all the members of this group, except for Howell and Stiles, are now deceased.

Eggshell thinning discovery.—The report by Ratcliffe (1967) that severe eggshell thinning was responsible for a precipitous decline of Peregrine Falcons *(Falco peregrinus)* in the British Isles, and the nearly simultaneous confirmation of a similar trend in this and other species in

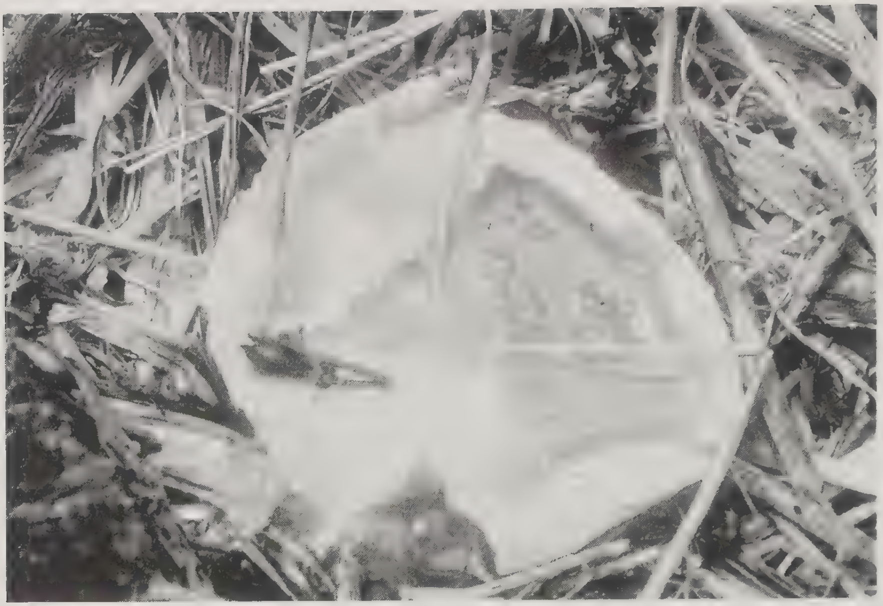

Fig. 6. Recently crushed Brown Pelican egg in nest on Anacapa Island, California. Photograph in 1969 by Lloyd Kiff.

North America by Joseph Hickey and his student, Daniel Anderson, suddenly validated the importance of museum egg collections. The WFVZ was thrust overnight into the global conservation arena. The shell thinning was soon linked to the contaminant DDE, a breakdown metabolite of the pesticide DDT (Hickey and Anderson 1968). The WFVZ funded some of the early field trips by Robert Risebrough and his associates to Anacapa Island in 1969, where they documented a complete crash of the resident Brown Pelican *(Pelecanus occidentalis)* nesting colony, resulting from the most severe eggshell thinning ever reported in a bird species (Risebrough et al. 1971). Historical specimens from the WFVZ collection and crushed eggshells from Anacapa Island were introduced as evidence in the landmark Wisconsin DDT hearings in 1971, the findings of which led to the 1972 Environmental Protection Agency ban on domestic DDT use. From this time on, there was a constant stream of researchers, many of them employees of federal agencies, visiting the WFVZ to obtain eggshell thickness measurements for their study species.

Egg collection.—During the 1970s and 1980s, the WFVZ experienced an intensive period of growth, which saw it incorporate major egg collections from all over the world. The Foundation was strategically situated to become the world center for egg-related research, since Harrison had already begun the process of acquiring and integrating other collections before the DDE breakthrough. In accordance with the axiom "the rich get richer, the poor get poorer," the existence of the large, actively managed egg collection at the WFVZ served as a magnet to attract other collections from institutional and private sources who appreciated the logic of establishing a single major egg collection (in defiance of another time-honored axiom about eggs and baskets), where researchers could study specimens more efficiently and inexpensively. Furthermore, the WFVZ was able to take advantage of a process of collection centralization that had already been initiated by other collectors and institutions.

Throughout this period, we maintained a singleminded emphasis on obtaining as many existing egg collections as possible. The last generation of North American oologists was passing before our eyes, and their collections were at risk from being discarded, or, almost as bad, being placed on display in non-academic settings, where they would soon deteriorate from exposure to light and be lost for scientific use. Julie and I made an 11,000-mile driving tour of North America in 1970 to visit as many living egg collectors as possible, about 20 in all, in hopes of persuading them to bequeath their collections to the WFVZ. Over the next two decades, all but one of the collections was donated to the Foundation by the collectors or their heirs. In actuality, there were few other institutions interested in the collections, or equipped to deal with them.

The most significant North American egg collections obtained during the 1970s and 1980s were those of John H. Brandt (Durango, Colorado), Charles Carter (Orlando, Florida), Richard Crossin (Tucson, Arizona), Samuel Dickey (Waynesburg, Pennsylvania), Willet Griffee (Lake Oswego, Oregon), Leroy Heaton (Oberlin, Kansas), Byron Knoblock (Quincy, Illinois), Urban Kubat (Milwaukee, Oregon), Travis Meitzen (Refugio, Texas), Lyle Miller (Youngstown, Ohio), Fred F. Nyc, Jr. (New Braunfels, Texas), Walter Spofford (Portal, Arizona), Robert Stabler (Colorado Springs, Colorado), and Alex Walker (Tillamook, Oregon). From California, the collections of Martin C. Badger (Santa Paula), Dan B. Bull (La Mesa), James R. Dixon (Escondido), Edward M. Hall (Whittier), Sidney B. Peyton (Fillmore), and Franklin J. Smith (Eureka) were the most important acquisitions. Unlike the older material housed by the major North American natural history museums, most of these collections contained "post-DDT" (> 1947, when DDT was first widely used) specimens which were to prove useful later in documenting the geographic and taxonomic scope of DDE-induced eggshell thinning on this continent and others.

Raymond J. Quigley (1918-), of Whittier, California, a prominent egg collector and talented bird photographer, not only gave his own important collection to the WFVZ over a period of several years, but also arranged for the transfer of the Nelson Carpenter (1885-1956) collection, the most

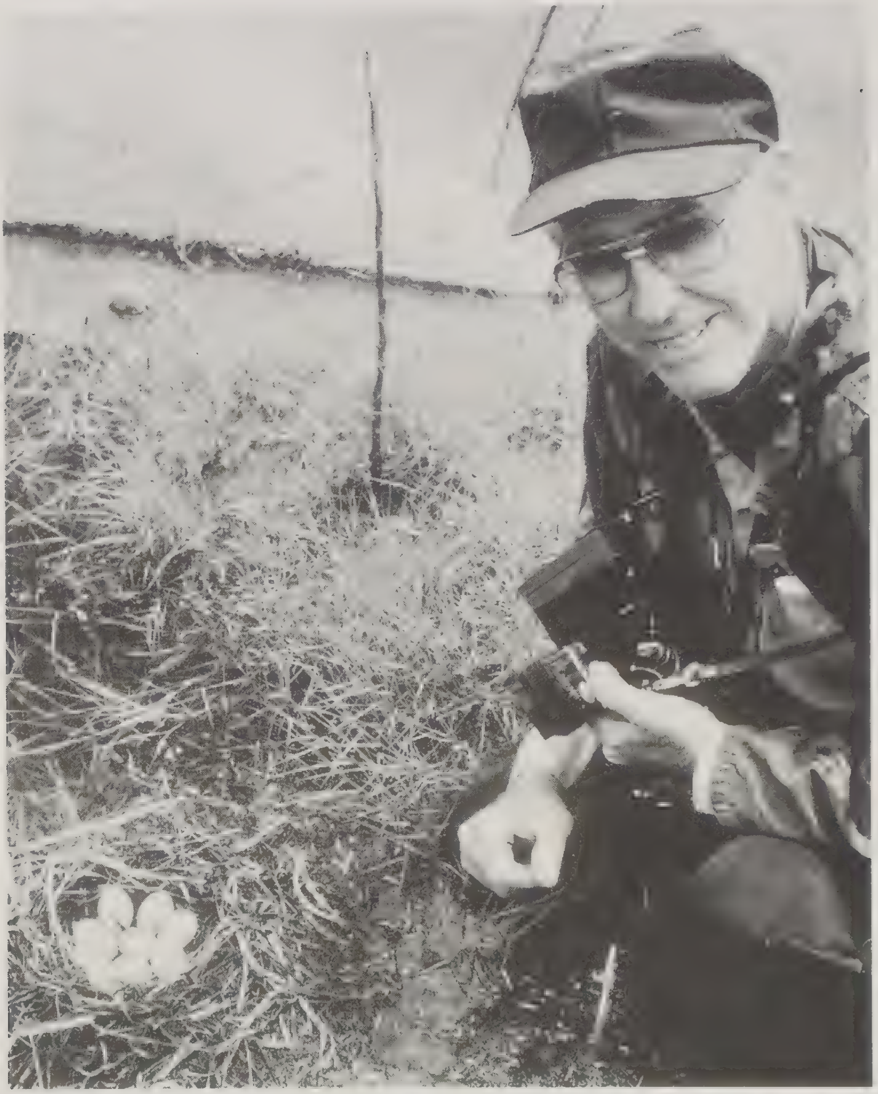

Fig. 7. Raymond Quigley at a Pied-billed Grebe nest, Lake Elsinore, California, June, 1983. Photograph by Lloyd Kiff.

comprehensive ever made of California breeding species, as well as the donation of several smaller, but important, collections. Although he spent his working career as a mail carrier, "Quig" was awarded the title of "Associate Curator" because of his valuable contributions to organizing the WFVZ egg collection. His exceptional knowledge of the history of North American oology led to his appointment to the COS History Committee, where he still serves, having been a member of that organization since 1937. Perhaps most importantly, Quigley's involvement with the WFVZ provided an invaluable endorsement of the WFVZ to his many friends in the aging egg-collecting fraternity, promoting a level of trust and cooperation that might otherwise have been lacking.

Special mention should be made of two Pennsylvania collections obtained by the WFVZ during the 1970s. The collection of J. Warren Jacobs (1868-1947) was obtained from his descendants in Waynesburg, Pennsylvania, in 1977. Among oologists, Jacobs, the director of "The Museum of Applied Oology," was more of a scholar than most, producing several interesting self-published items around the turn of the century. His contributions were recognized by the AOU, who elected him an Associate of the Union in 1889 and to the status of Member in 1904 (Palmer 1947). His collection, which contained many abnormal specimens, won a gold medal at the St. Louis World's Fair in 1904. Jacobs died in 1947, but his collection had been meticulously preserved by his heirs in a room above the family business, an oil distributorship, for 30 years.

Nelson D. Hoy (1905-1979), a hardware store owner from Media, Pennsylvania, was a man much like Ed Harrison, lacking a formal education, but possessing a consuming interest in collecting natural history objects of all kinds. While Harrison and Hanna had been busy acquiring collections on the West Coast, Hoy had been equally active in the East. He had ended up with about half of the collection begun by Philadelphia banker J. Parker Norris, Sr. (1847-1916), and greatly expanded by his son, J. Parker Norris, Jr. (1871-1931), arguably the finest private egg collection ever amassed in North America. The unparalleled long series of wood warbler eggs alone occupied more than an entire large cabinet. After lying fallow for many years, the collection was split up in the 1950s among Hoy, who obtained most of the North American species, Wilson Hanna, who obtained the many thousands of foreign sets, and "Lobo" Wolfe, who took only raptor sets. The convergence of these three prominent collectors to divide up this legendary collection represents one of the milestones of American oology, already nearing its final decline.

Hoy also obtained the superb Pennsylvania collections of Richard C. Harlow, known also as a successful university football coach, and the father-and-son collectors, Thomas and James R. Gillin, plus several other important Eastern collections, including those of John Cairns (North Carolina), Chauncey W. Crandall (New York), Samuel Ladd (Pennsylvania), and R. Bruce Overington (Maryland). Hoy maintained a regular museum on his property, and it was jammed full of egg cabinets, large collections of bird and mammal study skins, and over 1000 taxidermy mounts of birds and mammals. There he entertained scout troops and school groups on an almost daily basis.

Fig. 8. Nelson Hoy in his museum in Media, Pennsylvania.

Hoy was an early mentor of John duPont during the latter's childhood, and he was perhaps most reponsible for duPont's interest in natural history. It was widely expected, therefore, that his collection would go to the Delaware Museum of Natural History. However, in a surprisingly low-key bidding war, the foundation proved willing to pay more for the collection than the ever-thrifty duPont, despite his much greater resources, and Hoy agreed that the WFVZ was his choice as a final depository. Even so, he was unable to bring himself to part with the collection during his lifetime. When it was finally moved to the WFVZ in 1980, it more than filled a 42-foot trailer truck, and some wonderful mounted specimens had to be donated to a local museum. Hoy's was the largest egg collection ever obtained by the WFVZ, as it contained around 14,500 sets.

The efforts of the WFVZ to serve as a global depository for bird eggs did not go unnoticed in other countries. In the late 1960s and early 1970s the WFVZ shared its Westwood office with the fledgling L. S. B. Leakey Foundation, since Ed Harrison was one of the founders. Through the intervention of Louis Leakey, who still retained a childhood interest in egg collecting and always enjoyed "egg talk," the WFVZ obtained the V. G. L. van Someren collection of East African eggs and nests. Van Someren, who was trained as a dentist, but who was also the founding director of the National

Museum of Kenya, had made the collection with native helpers in Kenya and Uganda over a period of more than 60 years. Julie and I traveled to Kenya in 1969 to pack and ship the collection to the WFVZ. We were dismayed to find that the eggs were stored in small matchboxes with tiny scraps of collection data and that many data had been lost to termites. Furthermore, a fair portion of the sets were obviously misidentified, as confirmed later by several authorities on African birds, including Andrew Williams, John Colebrook-Robjent, and Leslie Brown (Britton 1980). Nevertheless, there was enough useful material to justify the trip to Africa to retrieve the collection, and the opportunity to establish a closer relationship with John and Andrew Williams brought many substantial benefits to the WFVZ in later years.

The A. W. Johnson, Jr. collection of Chilean eggs, which had been collected mainly by J. R. Goodall, was purchased from Mr. Johnson in the early 1970s after a tough negotiation. This involved flying the crafty, but very dignified British-born businessman to Los Angeles and putting him up in the posh Bel Air Hotel for several days. We traveled to Spain's Costa del Sol in 1983 to obtain the collection of British businessman F. G. H. Allen, who had lived in West Malaysia for many years. The collection not only contained important specimens from that country, but also from East Africa, where Allen had been stationed earlier. Several useful collections of African eggs were obtained from Archie van Reenen (South Africa) in 1980, Peter Ginn (Zimbabwe) in 1982, and Ron Thomson (Zimbabwe) in 1984.

The William Hobson collection was a small, but important, aggregation of eggs from the Palearctic region, rich in waders and raptor sets, which Hobson had obtained during his extensive travels to such out of the way places as Romania and Outer Mongolia as a United Nations official. It was obtained after Hobson's death only after a considerable struggle with U.S. customs procedures. The WFVZ could not legally import the collection without an export permit from the Republic of Ireland, yet at that time, at least, the country did not have a provision for issuing such a permit and did not regard the export of bird eggs as being a matter of governmental concern. A local lawyer was hired to persuade a high government official to write a one-of-a-kind dispensation for the export of the collection, and it was finally imported legally into the U.S. in 1977.

By far the most important collection of foreign eggs obtained by the WFVZ was that of Robert D. Etchécopar (1905-1990), a resident of Paris. He had received early training in the law, but soon abandoned that career to a life of collecting and writing several major books on the birds of the Middle East, North Africa, and China (e.g., Etchécopar and Hüe 1967). Etchécopar was a dapper French version of Ed Harrison, having inherited a sizeable fortune and an abiding interest in natural history. Throughout his lifetime, he invested his energies and financial resources into the acquisition of nice things, including numerous egg collections and a stupendous ornithological library. He was a close friend of Delacour, who recommended at every opportunity that his collection be deposited at the WFVZ. The transfer of the vast Etchécopar collection required us to go to Paris several times to pack and ship it. It was mailed to the WFVZ in hundreds of boxes, all of which eventually arrived safely. Only a single huge egg of *Aepyornis maximus* was hand-carried (with great trepidation, since it presented a bomb-like image on airport security X-ray monitors) to Los Angeles.

Etchécopar's collection contained over 7000 sets, few of which were collected by him personally, since he was also a collector of collections. His holdings included the eggs of many species not previously represented in U.S. institutions, since they had been taken mostly in former French colonies, where few American or British collectors had set foot. Among the many component collections gathered by Etchécopar were those of A. Brosset (Morocco, Galapagos, India), F. Chabot (France), G. Cogneau (France, worldwide), Coryndon Museum (East Africa), Alex Forbes-Watson (Kenya), R. Hemery (worldwide), W. B. Hitchcock (Australia), Sir Frederick J. Jackson (East Africa), Ed Lebeurier (France), Gerald Morel (Senegal), W. Nichols (British Isles), J. Rapine (France, worldwide), J. C. Voisin (Ivory Coast, Cameroons), and Hugh Whistler (India, Palearctic). The collection also contained unique specimens from such out of the way places as Madagascar and Antarctica.

Major collections were acquired from other North American institutions, especially university museums, between 1970-1994, some as "permanent loans," but more often in exchange for reference collections of North American eggs housed in the distinctive clear plastic boxes used in the WFVZ collection. The principal acquisition of egg collections from institutions include those formerly housed by the Academy of Natural Sciences of Philadelphia, Cumberland Science Museum (Nashville, Tennessee), Los Angeles County Museum of Natural History, Louisiana State University, Massachusetts Audubon Society, North Carolina State University, Oakland Museum, Oregon State University, Patuxent Wildlife Research Center, Pomona College, San Diego Natural History Museum, San Jose State University, Santa Barbara Museum of Natural History (foreign specimens only), University of Delaware, University of Utah (the portion not transferred earlier), and the Whatcom Museum of History and Art (Bellingham, Washington). Most of these collections, particularly those from the Academy of Natural Sciences, Louisiana State University, and the San Diego Natural History Museum, were each comprised of several large and historically important component collections.

By 1994 the WFVZ collections contained over 180,000 egg sets with at least minimal collection data, plus about 25,000 nests. Both collections are by far the largest in North America (Kiff 1979a, Kiff and Hough 1985) and are probably the largest in the world. By default, they have become the "national collections" of such specimens. Indeed, almost half of the egg sets in North American museum collections are presently at the WFVZ (Kiff and Hough 1985), the result of integrating the holdings of over 300 component collections.

The WFVZ pioneered several curatorial techniques for egg collections that are now followed by other institutions (Kiff 1989). Some of these were originally Harrison's ideas, e.g., housing both egg sets and nests in clear plastic boxes and storing them as separate collections. Others evolved over time in an effort to increase researcher efficiency, e.g., placing the often fragile original data slips in protective archival plastic sleeves and filing them in envelopes in synoptic order.

Study skin collection.—The WFVZ has been so closely identified with bird eggs in ornithological circles that many have overlooked the important study skin collection gradually amassed by the Foundation, mostly through its own collecting expeditions, but also through the acquisition of existing collections from individuals. Principal among these have been the contributions of Manuel Marín A., of Santiago, Chile, whose personal collection included half of the R. A. Phillipi Chilean collection (the other half was transferred to the Museum of Comparative Zoology years earlier). Starting in 1980, owing in part to his participation in numerous WFVZ-sponsored expeditions, Marín has contributed more specimens to the WFVZ study skin collection than any other individual. The WFVZ also obtained the study skin collection of Chilean naturalist, Luis Peña, after an earthquake damaged his Santiago home. Joe T. Marshall deposited his exceptional collection of *Otus* specimens at the WFVZ, and 2362 study skins, all collected in Texas, were obtained from Warren Pulich of Irving, Texas in 1992. Andrew Williams, now living in Australia, made important study skin collections for the WFVZ in several countries in Africa and also Costa Rica between 1970-1979. His late father of field guide fame, John G. Williams, had a long association with the WFVZ, and he, too, contributed nearly 2000 study skins to the collection between the mid-1950s and 1986.

The WFVZ study skin collection now includes over 53,000 specimens, making it at least the 16th largest among North American collections. An important aspect of the collection is that much of it is of recent origin and is therefore accompanied by modern data. Furthermore, owing to the contributions of master preparators like John Schmitt, Manuel Marín, and

Andrew and John Williams and their African assistants, most of the specimens are of unusually high quality.

Collecting expeditions.—Throughout its existence, the WFVZ has funded collecting expeditions to other countries, mostly in tropical regions. In addition to projects already mentioned, collecting was supported in American Samoa (Richard Crossin and Lawrence G. Huber, 1969-1971) Argentina (Angel Contino, 1970-1987), Chile (Luis Peña, Manuel Marín, and Dennys Veas, 1979-1982), Costa Rica (Walter and Elsie Fiala, 1971-1973; Ciro B. Gonzales, 1966-1967; Lloyd F. Kiff, 1969-1974; Manuel Marín, N. John Schmitt, Fred Sibley, and Kurt Stolzenburg, 1984-1986; Andrew Williams, 1970-1971), Guatemala (Lloyd and Julie Kiff, 1969), Kenya (Lloyd Kiff, 1974), New Caledonia (Fr. Rene de Naurois, 1978-1979), Philippines (Peter Cua, 1983-1988), and Uganda (Michael and Patricia Fogden, 1970-1972).

Among more ambitious ventures, the WFVZ sent Andrew Williams and his Kenyan assistant, Robert Kyongo, on a collecting expedition to Madagascar in 1972 in cooperation with Charles Sibley (Peabody Museum), Con Benson (Cambridge University), the French Academy of Bordeaux, and John Colebrook-Robjent of Zimbabwe. The combined findings of these diverse participants were published serially by Benson et al. (1976-1977).

The WFVZ mounted a two-year collecting venture in Sabah, East Malaysia, in 1981-1982, under the direction of the husband-and-wife team of Frederick Sheldon and Jody Kennard of Yale University. This was intended primarily as a salvage operation, since the harvesting of primary forests by several international timber companies was in full swing in Sabah at the time with the encouragement of the state government. The project, which involved the efforts of 16 different American biologists at one time or another, led to the creation of the largest important modern collection of Bornean birds, all collected in areas where the primary forest has now been completely removed (a most disheartening aspect of the project). Other participants, some of whom made more than one trip to Sabah, included Suzanne Bond, Milan Bull, George Dodge, Gary Falxa, David Foote, Dana Gardner, Thomas and Eleanor Howell, Lloyd Kiff, Andrew Mack, Manuel Marín A., Dominique Pahlavan, John Schmitt, and John Zoeger. It was the most ambitious field program ever attempted by the WFVZ, and it was accomplished with great financial sacrifice by Ed Harrison, who funded the entire venture, and personal sacrifice by the participants, most of whom contracted malaria. More than 30 publications resulted from the project, including Ahlquist et al. (1984), Olson (1987), Sheldon (1985, 1986, 1987), Sheldon and Francis (1985), Sheldon and

Marín (1985), and Sheldon et al. (1983).

Another long-term collecting project was initiated in Ecuador in 1987 under my direction and that of Manuel Marín A. (1960-), with Juan Manuel Carrión, a talented Ecuadorian biologist and man of innumerable political and musical talents, serving as the local project manager. Field parties were sent to Ecuador on 16 occasions between 1987-1992, and collecting was done in most major sectors of the country. There was a special emphasis on obtaining eggs and nests, since the most elementary details of the breeding biology of so many primary wet forest Neotropical species are

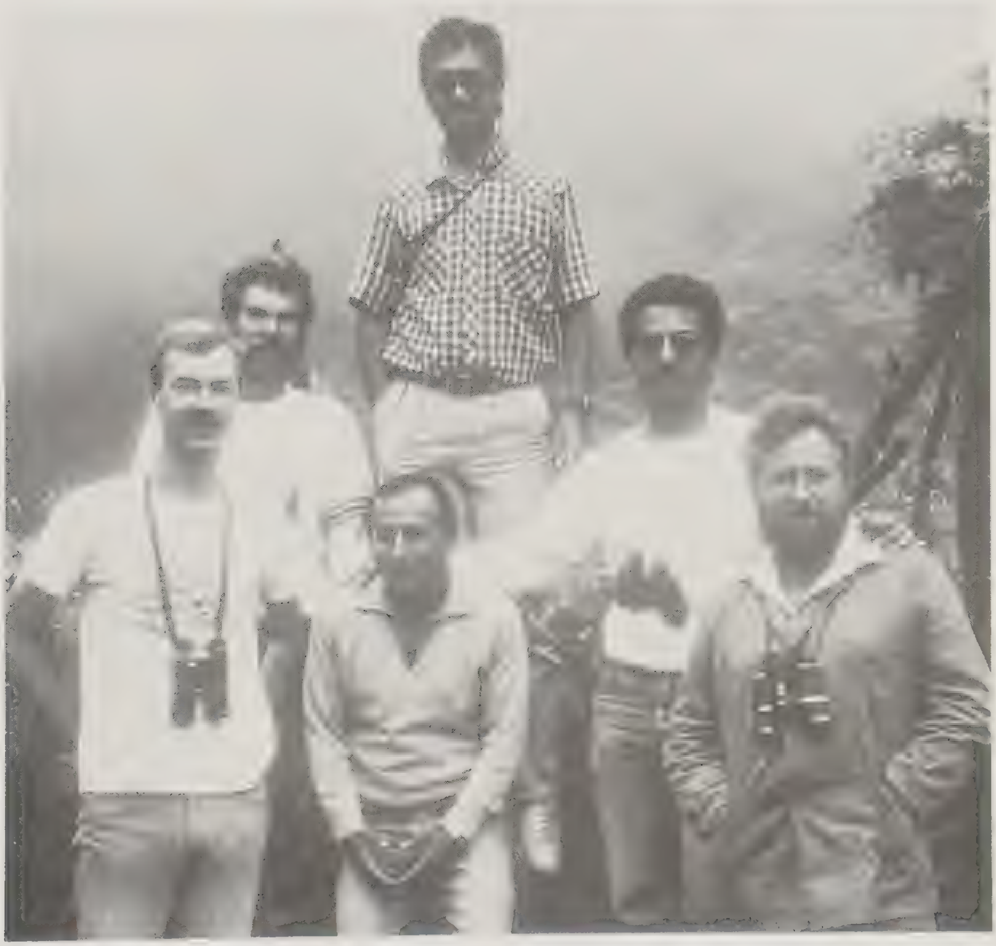

Fig. 9. Participants on the Western Foundation expedition to Loja Province, Ecuador in March, 1991. From left to right: Dana Gardner, Bill Baker, Ecuadorian driver, Juan Manuel Carrión, René Corado, and Johan Ingels. Photograph by Lloyd Kiff.

still so poorly known. More than 5000 study skins were also obtained on these trips, and more than 1000 were deposited at the Museo Nacional de Ciencias Naturales in Quito, the local co-sponsor of the project. Participants on one or more of the the collecting trips included David Barber, Pamela Beals, René Corado, Adam Fry, Dana Gardner, Mark Holmgren, Johan Ingels, Kim Livingstone, Kathy Molina, Patricia Moore, Fred Sibley, John Schmitt, and Francisco Sornoza. Preliminary results of the Ecuadorian work were reported by Kiff et al. (1989) and Marín and Carrión (1991, 1994).

Research.—The WFVZ never particularly viewed itself as a research institution in the conventional sense, but rather as a facilitator of research. For the organization to have concentrated too heavily on the personal research interests of its staff members would have been to neglect the more important role that the WFVZ needed to fill for the global ornithological community within a rather narrow window of opportunity.

In planning field expeditions and reporting the results, there was much emphasis on what is presently called "natural history," because most of the participants were old-fashioned naturalists with a love for simple, descriptive field studies. Only a few of the biologists who passed through the WFVZ over the years had higher job aspirations, so WFVZ-sponsored researchers seldom felt compelled to conduct so called "alpha research" for reasons of personal advancement. Thus, the WFVZ supported basic life history studies (Rowley 1963, Elliott 1969, Sherry 1986, Marín 1989), "first" nests and egg descriptions (Crossin and Petite 1962, Rowley 1962, Rowley and Orr 1962, Kiff 1974, Harrison and Kiff 1977, Kiff 1977a, 1979b, Kiff et al. 1980, Klein et al. 1991), and short papers on misidentified egg specimens in museum collections (e.g., Boyce and Kiff 1981, Kiff 1981, 1988a). Over the years, regular data contributions were made to the massive "Handbuch der Oologie" project begun by Max Schönwetter and continued by Wilhelm Meise (e.g., Schönwetter and Meise 1983), as well as to other ambitious compendia (e.g., Bent 1968, Makatsch 1974, Narosky et al. 1983).

The WFVZ also supported species-level and infraspecific taxonomic studies, e.g., those of Chilean birds by Marín A. et al. (1989) and several on Mexican species by Phillips (1966), Orr and Webster (1968), Rowley (1968), and Rowley and Orr (1964), based on traditional suites of external morphological characters. The latter paper, and a later one on the Black-and-yellow Silky-flycatcher *(Phainoptila melanoxantha)* of Costa Rica (Kiff 1979b), were of interest because they showed how egg characters, especially color, could be of taxonomic significance.

A large proportion of the now vast global literature on DDE-induced eggshell changes, including comprehensive papers by Anderson and Hickey (1972, 1974), Faber and Hickey (1973), Gress et al. (1973), Morrison and Kiff (1979), and Fyfe et al. (1988), are based on data from historical (pre-1947) specimens in the WFVZ collection. In 1973, British biochemist David Peakall, then at Cornell University, devised an ingenious method for extracting organochlorine residues from the lipid portions of the eggshell membranes still present in museum eggshells. Using WFVZ specimens, he was able to demonstrate the presence of DDE in peregrine eggs collected in California as early as 1948, shortly after the introduction of DDT, in sufficient quantities to account for the observed thinning in the eggshells (Peakall 1974, Peakall et al. 1983). This success led to several later papers on eggshell thinning in other raptors, based on the "membrane extract method" (Kiff et al. 1979, 1980, 1983, Peakall and Kiff 1979, 1988).

Because of the paternalistic influence of Herbert Friedmann, who was director of the nearby LACMNH for many years, we were drawn into the interesting world of host parasites. The WFVZ egg collection supplied much of the basic material for two major updates of his catalogue of cowbird hosts (Friedmann et al. 1977, Friedmann and Kiff 1985), and Friedmann encouraged WFVZ field workers to seize every opportunity to add to the knowledge of New World host parasite species (e.g., Kiff 1973, Kiff and Williams 1978).

Library and archives.—The WFVZ now houses one of the largest ornithology libraries in the world. In addition to Harrison's own library and the one obtained from the Sampson estate, the WFVZ obtained major book and journal collections from the estates of Jean Delacour, James R. Dixon, Nelson D. Hoy, Howard Keck, John R. Pemberton, Leigh Pennington, Raymond J. Quigley, John McB. Robertson, William J. Sheffler, Ray Thomas, and Col. L. R. Wolfe. The foundation also contains the "Dean Amadon Birds of Prey Library," the nucleus of which was donated by Amadon, who still makes regular additions to the holdings. Many smaller libraries were also purchased or received, and using whatever uncommitted funds I could find, I purchased current and out-of-print books for the library at a torrid pace for about 20 years. A recent count showed that the WFVZ library contained over 8000 books and monographs on birds and closely related topics, as well as runs of over 400 bird journal titles, including many "extinct" and foreign titles not readily obtainable from other North American libraries.

In 1990 an agreement was reached with the Cooper Ornithological Society to move the stock of back issues of *Condor* and *Studies in Avian Biology* from UCLA, where they had been stored for over 40 years, to the

WFVZ, and to contribute staff time to processing orders for the back issues. In return, the COS agreed to deposit all publications received in exchange for *Condor* to the WFVZ Library. As a further part of the agreement, the WFVZ offered to provide free photocopies of papers from the less common journals on the list to any COS member, and this arrangement has been happily maintained over the years. The WFVZ also stores the back issues of the *Pacific Seabird Bulletin*, the journal of the Pacific Seabird Group, and offers equivalent photocopying services to its membership.

The WFVZ archives contain the original field notes, journals, and unpublished manuscripts of 84 ornithologists/collectors, as well as large collections of movies, photographs, and 35 mm transparencies of birds, the most notable ones being those of Ed Harrison and Donald Bleitz.

Assistance to researchers.—The principal measure of the progress of the WFVZ is best gauged by the number of research projects that the foundation has been able to assist. During the period from 1983-92 WFVZ collections, mostly egg sets and their associated data, were used annually in about 150 extramural research projects through mailed data requests, loaned specimens, and by researcher visits to the collections. In aggregate, since its inception, the WFVZ has now provided assistance in some form to over 4000 research projects, all free of charge. Between its founding in 1956 and mid-1992, there were 453 technical publications based all or in part on the WFVZ collections.

The most extensive extramural project in which the WFVZ has been involved is the *Birds of North America* (BNA) project. Originally, the WFVZ was invited to be a co-sponsor of the series, but it became rapidly apparent that it was well beyond the capacity of the WFVZ to be a legitimate partner in this massive enterprise. It was agreed, however, that the foundation staff and volunteers would provide photocopies of egg data cards and egg measurements to preparers of species accounts. The WFVZ permitted Sam Sumida and, later, curatorial assistant René Corado to measure tens of thousands of eggs with the help of volunteer data recorders. I subsequently edited the measurement data and provided simple statistical summaries to the authors. Since 1991 photocopies of the egg records for over 500 North American species and egg measurements for over 400 species have been provided to BNA contributors with WFVZ support. In aggregate, the work has occupied over three person-years of labor.

Among incidental contributions to the California ornithological community, the WFVZ houses and curates the files of the California Bird Records Committee and serves as the regular meeting place for California Partners in Flight and the local chapter of the National Audubon Society.

Publications.—The WFVZ publications program grew in stature under the meticulous von Bloeker, although the printing schedule proceeded by fits and starts, reflecting the unpredictable availability of funds. In fact, throughout the 1970s the publications were viewed almost as a luxury, and von Bloeker was forced to sit on some manuscripts for years before the money could be found to publish them. He served as the WFVZ editor from 1963-1988, although one issue of the *Proceedings* (Hobson and Flint 1972) was edited by F. Gary Stiles. Other *Proceedings* published during this period, in addition to those already mentioned, include papers on Mexican bat distribution (Gardner 1965), ecological aspects of the food habits of insectivorous bats and screech-owls (Ross 1967, 1969), a survey of the herpetofauna of the Lower Colorado River (Vitt and Ohmart 1978), an examination of urban birds of Papua New Guinea (Bell 1986), a gazetteer of type localities for Guatemalan birds (Dickerman 1987a), an annotated list of the birds of El Salvador (Thurber et al. 1987), and a distributional and taxonomic list of birds of prey of the world (Amadon and Bull 1988, with contributions from J. T. Marshall and B. F. King). *Occasional Papers* on Nicaraguan harvest mice (Jones and Genoways 1970) and avian systematics (Dickerman 1987b, Banks 1987) were also published during this period.

After having served as assistant editor for several years, Michael L. Morrison took over the editorship in late 1987. His tremendous energies (along with better funding) resulted in a flurry of WFVZ *Proceedings*, including a comprehensive review of the distribution of amphibians and reptiles in Guatemala and Belize (Campbell and Vannini 1989), a monograph on the ecology of the San Clemente Loggerhead Shrike *(Lanius ludovicianus mearnsi)* (Scott and Morrison 1990), an annotated check-list of the birds of East Africa (Short et al. 1990), a study of molt in the genus *Spizella* (Willoughby 1991), and the proceedings of a symposium on the Marbled Murrelet *(Brachyramphus marmoratus)* (Carter and Morrison 1992). An additional *Occasional Paper* on Oaxacan birds (Parkes 1990) was also published. An important study of the biology of several Costa Rican swift species (Marín and Stiles 1992) was edited by Assistant Editor Kimberly With. Morrison was also responsible for editing an extensive monograph on the endangered Puerto Rican Parrot *(Amazona vittata)* (Snyder et al. 1987). Publication of this 384-page hardbound volume represented a major accomplishment for the WFVZ.

James W. Wiley (1943-) became the WFVZ editor in 1992, and during his tenure several more *Proceedings* were soon produced. These included papers on the Unicolored Jay *(Aphelocoma unicolor)* in Chiapas, Mexico (Webber and Brown 1994), systematics of Cooper's Hawks *(Accipiter cooperii)* and Northern Goshawks *(A. gentilis)* in North America (Whaley and White 1994), and Long-billed Corella *(Cacatua tenuirostris)* of Australia (Emison et al. 1994).

The WFVZ sought to publish longer natural history and systematics studies of the type formerly published by the major North American natural history museums, at the same time providing an outlet for monographic manuscripts too long for the major ornithological journals, but too short for *Studies in Avian Biology* and *Ornithological Monographs.* In its later years, the publications program was increasingly used as an alternative outlet by the staff members of the major U.S. natural history museums and other institutions that were becoming increasingly reluctant to publish traditional museum studies.

Conservation program.—From the late 1960s to 1994, the WFVZ participated in various types of conservation activities, mainly reflecting the interests and often the whims of the staff.

During his early years, Harrison was involved in making films on California Condors *(Gymnogyps californianus)* in the wild, first as J. R. Pemberton's assistant, and later as the frequent field companion of Carl Koford, who conducted a landmark study of the species between 1939 to about 1947 (Koford 1953). This interest in condors was passed along to the rest of us at the WFVZ. Along with other volunteers and agency biologists, Harrison and I, often with Ray Quigley, participated annually on the fall survey of condors through its entire duration from 1966-1980. Acting on a 1969 tip from a Mexican game warden that condors still occurred in Baja California, the WFVZ co-sponsored four expeditions with the U.S. Fish and Wildlife Service to the plateau of the Sierra San Pedro Martir, Baja California Norte, during the 1970s to explore the possibility that condors still occurred there and to assess the suitability of the area for possible future condor releases (Kiff 1977b, Wilbur and Kiff 1980). We concluded that the species was probably extirpated from Baja California in the 1930s, but that with adequate provisioning of food at some seasons, condors might be successfully re-established there in the future.

Starting in the 1960s, the WFVZ funded my personal involvement in the California Condor Recovery Program, supported my tenure as Team Leader of the Condor Recovery Team from 1986 to 1993 (Kiff 1990, Kiff et al. 1996), and assisted with condor recovery in many small ways behind the scenes. For example, the "Condor Survival Fund" was established in 1985 by the WFVZ with urging and guidance from Noel Snyder, then U.S. Fish and Wildlife Service Condor Biologist, and this small account funded numerous modest, but useful, research projects in support of the recovery program.

With considerable guidance from Brian Walton of the Santa Cruz Predatory Bird Research Group, the WFVZ staff hacked three young peregrines provided by that facility from the roof of Westwood Center, Ed Harrison's office building, annually between 1981 to 1983. At the time, the species had been extirpated from southern California. As a result of the releases and the immigration of birds fledged from non-urban sites, there are now at least 10 pairs of peregrines nesting in the Los Angeles megalopolis (B. Walton pers. comm.). Between 1975 to 1994, Sam Sumida annually measured eggshells taken from wild peregrine nests by the Santa Cruz Predatory Bird Research Group and agencies from other regions as a contribution to my studies and those of many others on the effects of DDE on the species. In an effort to combine the legacy of oologists, including their recollections and their specimens, with the published literature, field notes, and other evidence from professional ornithologists, I produced two accounts of the history of peregrines in California and other parts of North America and related this to the current status of the species (Kiff 1980, 1988b).

As a part of the Ecuador Project, the WFVZ assisted in the founding and development of Fundación Maquipucuna, a grass-roots organization that works to save habitat and promote conservation education in Ecuador. A timely grant from the WFVZ helped keep the "Threatened birds of the Americas" project alive (Collar et al. 1993).

Meetings.—In addition to a number of local affairs, mostly in support of the California Condor Recovery Program, the WFVZ co-sponsored three important meetings of international significance:

(1) The "First International Symposium on the Vultures" with the U.S. Fish and Wildlife Service at the Santa Barbara Museum of Natural History in March, 1979. The meeting was chaired by Sanford R. Wilbur and was attended by delegates from four continents, many with WFVZ support. The proceedings were later published by the University of California Press (Wilbur and Jackson 1983), and, as a direct result of the symposium, a special section on vultures was formed by the International Council for Bird Preservation.

(2) A meeting of the World Working Group on Birds of Prey in Sacramento in November, 1985; I served as Chair of the Program Committee. The meeting featured a day-long symposium on raptor conservation problems in Latin America, and the WFVZ funded or arranged for the attendance of delegates from 17 Latin American countries. The proceedings of this conference, the first gathering of its kind, were later published by the WWGBP (Chancellor and Meyburg 1986) with partial funding from the WFVZ.

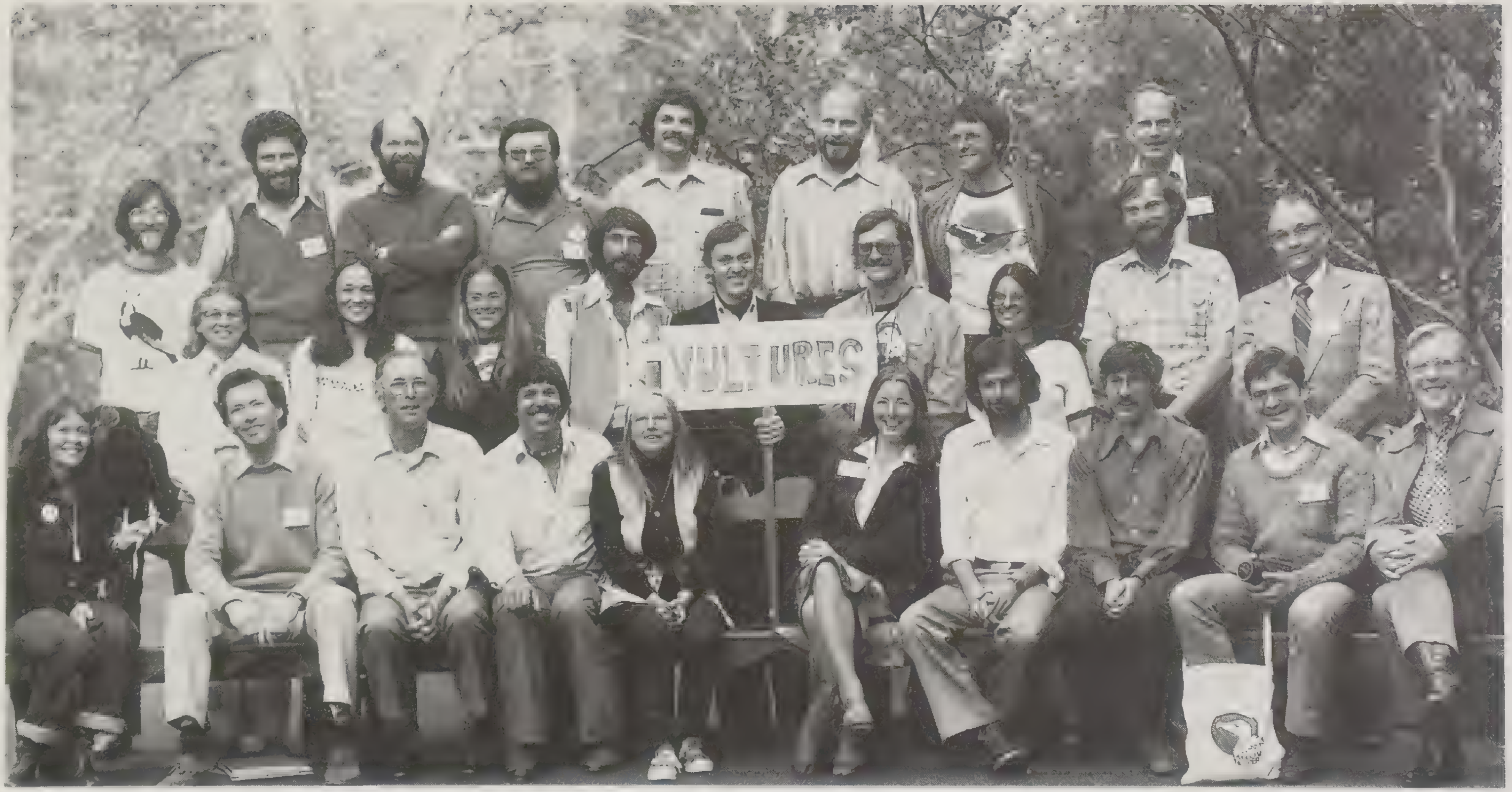

Fig. 10. Speakers at the First International Symposium on the Vultures, Santa Barbara, California, March, 1979. Top row, left to right: Unidentified, Russel Friedman, Colin Pennycuick, Dwight Simons, Sandy Wilbur (organizer), Michael Fry, Peter Mundy, Stan Wiemeyer. Middle row, left to right: Unidentified, Deborah Davis, Patricia Parker Rabenold, Amadeo Rea, Michel Terrasse, Jerome Jackson, Sheila Gaby, unidentified, Ray Erickson. Seated, left to right: Unidentified, David Houston, Steve Herman, Lloyd Kiff, unidentified, Sheila Mahoney, Mike Wallace, Jerry McGahan, John Ledger, Ed Henckel. Photograph by Sam Sumida.

(3) The first joint meeting of the American Ornithologists' Union and the Cooper Ornithological Society at the University of California at Los Angeles in June 1990. This historic meeting was originally conceived by the late Ralph Schreiber, who died in early 1989, just as formal plans were being initiated. Somewhat reluctantly, I agreed to serve as co-chair of the Committee on Local Arrangements with Bryan Obst of the UCLA Biology Department, and we soon moved the venue of the meeting from the University of Southern California to UCLA. Along with the Natural History Museum of Los Angeles County, the UCLA Biology Department agreed to stand as a co-host, but the support of the university was limited to Obst's salary and that of the LACMNH to subsidizing the final banquet, a free-flow affair held throughout the museum. The main backing for the meeting, which had a budget of over $300,000, was contributed by the Bleitz Wildlife Foundation through the WFVZ. The joint meeting was attended by nearly 800 persons, and it featured four symposia, two of which eventually led to the publication of important volumes (Beissinger and Snyder 1991, Rothstein and Robinson 1998).

For most of the 1970s and 1980s, the WFVZ hosted informal gatherings of local ornithologists at the WFVZ museum building behind Harrison's home on Thursday evenings approximately every two weeks. These highly social events filled to some extent the void left by the demise of the Southern Division of the Cooper Ornithological Society in the late 1960s. The WFVZ served as the social center for local ornithologists, serious birders, bird photographers, bird artists, and falconers. Ornithologists and graduate students from as many as nine local universities and colleges sometimes crowded into the small quarters to hear informal presentations from their colleagues. Occasionally, presentations were given by visiting luminaries, including Ernst Mayr, Charles Sibley, Jared Diamond, Herbert Friedmann, Jean Delacour, and Allan Phillips. There was never enough space or chairs, so the audience sat on the floor between rows of specimen cabinets. The gatherings became highly dynamic forums for the exchange of ideas, often bringing together a startling mix of orientations and intellects with the common denominator being a collective interest in birds (and, for many, beer). The meetings were made all the more interesting by the fact that Harrison never got around to installing a bathroom in the WFVZ museum, a source of constant vexation to visiting researchers and the staff.

Staff.—After having served as the WFVZ curator for several years, I assumed the title of "director" in 1975, hoping that this would help convey the sense that the WFVZ was an actual organization and not just a private collection. It was a singularly empty title, however, and one predicated on

Fig. 11. The Western Foundation of Vertebrate Zoology staff in the mid-1980s. Standing, left to right: Manuel Marin, Jim Jennings, Jon Fisher, John Schmitt, Dana Gardner, Lloyd Kiff; kneeling, Sam Sumida. Photograph by Sam Sumida.

considerable hope, since at that time the staff consisted of only one other paid employee, plus several volunteers. Clark "Sam" Sumida, a local photographer, was hired in 1971 to assist with curatorial chores, and he was appointed Collection Manager in 1981. By the late 1970s, the WFVZ was able to maintain one or more curatorial assistant positions, and those with several years service include Liga Auzins, Roger Cobb, Eduardo Inigo, James Jennings, Manuel Marín A., Dominique Pahlavan, Walter Wehtje, and, since 1987, René Corado. Jon Fisher was hired to serve in the joint roles of WFVZ administrative assistant and librarian in 1981, and he still serves in those capacities.

Michael L. Morrison joined the WFVZ as a curatorial assistant in 1977, following the completion of his Master's degree at Texas A & M University, but he soon proved so capable that he was promoted to the position of assistant curator. After a stint of more than a year, he left to complete his doctorate at Oregon State University, but after the completion of his studies, he re-affiliated with the WFVZ in various volunteer capacities, most recently as Research Director. Morrison was atypical of the approximately 150 employees and volunteers of the WFVZ over the years, since he was interested in pursuing biology as a profession. Most of the persons recruited by the WFVZ, generally for very low wages, had no formal biological training and ultimately went into other professions. Similarly, the WFVZ has enjoyed the valuable contributions of a multitude of volunteers, some of them for many years, but few have had a particular interest in ornithology.

The WFVZ has benefitted enormously from its association with two well known bird artists, Dana Gardner (1950-), and John Schmitt (1949-). Gardner is well known for illustrating many of Alexander Skutch's books (e.g., Skutch 1989), as well as several field guides, including those for Costa Rica (Stiles and Skutch 1989) and Wallacea (Coates and Bishop 1997); plates for most of the Neotropical books were painted from WFVZ specimens. Working in part from the WFVZ collection, Schmitt recently completed the plates for a field guide on Palearctic raptors (Clark and Schmitt 1999). Both Schmitt and Gardner are also excellent bird skinners and field companions, and they were frequently coerced into participating on WFVZ expeditions more for their latter talents than for their fine artwork.

THE SEARCH FOR A HOME (1988-1991)

Throughout its formative years and up until the mid-1980s, the foundation was supported almost entirely by funding from Ed Harrison.

Fig. 12. John Schmitt skinning birds in the Napo region of Ecuador in 1988. Photograph by Manuel Marín.

Without his financial commitment, and the willingness of the staff to work for low wages, the organization would have perished. By the mid-1980s, however, Harrison's ability to continue funding the WFVZ was waning, and it seemed likely that he would soon be unable to hold the organization together. Meanwhile, there was mounting internal pressure to resolve the future of the foundation. Despite its growing international reputation, the WFVZ was, after all, still operating out of an outbuilding in a backyard, a chain-link fenced enclosed portion of a subterranean parking lot, and two or three small rooms on different floors of an office building. It was obvious that this could not be a permanent situation and that some provision had to be made to ensure the future survival of the organization, or at least its collections.

During the late 1970s, attempts were made to affiliate with the Santa Barbara Museum of Natural History (SBMNH), and the proposal progressed far enough to commission an attractive rendering of a Spanish-style building that would house the foundation on the oak-wooded grounds of the

Fig. 13. Donald Bleitz.

SBMNH. These plans gradually went for naught, however, as the SBMNH Board of Trustees was unwilling to offer any support for the proposal other than providing the building site. Furthermore, the Board would not grant permission for the WFVZ to raise funds in the Santa Barbara area for the new building, even though the SBMNH would own it. Since the WFVZ had no endowment or other sources of funds for such a venture, the plan was unworkable. As the years wore on, the once-exciting notion of moving the WFVZ to Santa Barbara gradually atrophied. Nevertheless, relations between the organizations remained friendly, and Ed Harrison even served on the SBMNH Board of Directors for several years.

During the mid-1980s, plans were made to merge the WFVZ with the Bleitz Wildlife Foundation (BWF), a non-profit organization that existed mainly to support the personal natural history interests of the founder and president, Donald Bleitz (1916-1986), a well-known bird photographer of Hollywood, California. Bleitz and Harrison were longtime friends, and Harrison was the perennial vice-president of the BWF. Reflecting their mutual concerns about the fates of the two foundations, a letter of intent to merge the BWF and the WFVZ was drafted and signed by Bleitz and Harrison in late May 1986. Bleitz did not live to see the merger accomplished, however, as he died within a month, and the WFVZ soon took over the management of the BWF. During the period from 1989 to the end of 1991, Julie Kiff (1943-) served as director of the BWF with primary responsibility for settling Bleitz's complicated estate, most of which was bequeathed to the BWF.

A reorganization and diminution of the BWF Board of Directors occurred in 1987-88, and most of the remaining members, including James Clements, L. Richard Mewaldt, and Jack von Bloeker, Jr., were also WFVZ Board members. A joint agreement to operate the foundations "in parallel" was approved by the State Attorney General, and plans were made to eventually merge the assets of the two organizations. It was a fortuitous union from the WFVZ standpoint, and a testimony to Harrison's long years of support for Bleitz. The BWF had sizeable resources, but little in the way of actual programs. In contrast, the WFVZ was program-rich, but suffering from a chronic lack of money. Thus, even before the actual merger occurred in 1993, it was agreed that the BWF endowment income should be used to support WFVZ programs.

Based on the conviction that the WFVZ needed to affiliate with a "mother institution" to ensure the survival of its collections, if not necessarily its own identity, the WFVZ entered into a formal partnership with the Natural History Museum of Los Angeles County (the new name for the former LACMNH) in February 1989. At the time, it seemed to be the logical institution with which such a partnership should be arranged. Ed Harrison had long served as President of the Board of Governors of the LACMNH, and the staffs of the two bird collections were close friends. The intent was to construct a new ornithological research center somewhere in the Los Angeles area where the respective bird collections of the two institutions could be merged and perhaps other major local collections (e.g., the one at UCLA) added. The LACMNH agreed to find a site and raise the necessary funds to construct the proposed center and to pay the salaries of the four WFVZ employees. For its part, the WFVZ was to contribute its collections to the venture and to fund the management of the future joint programs of the new research center. The "inheritance" of the BWF made the latter prospect feasible.

The agreement with the LACMNH was formalized on in February 1989. Following the unexpected death of the Curator of Ornithology, Ralph Schreiber, a new curator could not be immediately hired, since the museum was locked into one of its perennial hiring freezes, and I was assigned Schreiber's duties in addition to those associated with the WFVZ directorship. This plan worked mainly to the advantage of the LACMNH, since I and the other WFVZ staff members devoted much of our time to the completion of a splendid new 17,000-sq ft bird hall in the museum, a complex project that had been the vision of Ralph Schreiber and his ornithologist wife, Elizabeth A. Schreiber. As previously described, the WFVZ also ended up heading the arrangements for the first joint meeting of the AOU and COS. Increasingly, little time could be devoted to promoting the interests of the WFVZ.

During this period, the LACMNH dutifully paid the salaries of the WFVZ staff, but the museum was not successful at finding a new facility where the LACMNH and WFVZ collections could be merged. This was not for the lack of mutual effort, however. One after another, eight separate potential sites in the Los Angeles area for the "mega-collection" were proposed, investigated, pursued, and commission hearings attended, but all were eventually abandoned for a variety of reasons, mostly unrelated to the WFVZ or the LACMNH. In general, however, there was a constant trend, disturbing to us, toward merging the WFVZ into the LACMNH, rather than establishing a legitimate partnership, and we suspected that there was an underlying assumption by the LACMNH Board of Trustees that if they held out long enough, Ed Harrison would end up paying for a new building. This was not feasible, however, and both parties grew increasingly restless. Eventually, probably in some desperation, the LACMNH offered to provide the WFVZ with a total of 8000 sq ft of space in the present LACMNH building, less than half of the space that the WFVZ collections already occupied! This signaled the last gasp of the once-promising partnership, and, exercising an escape clause in the agreement, the WFVZ withdrew from the arrangement in September 1991.

THE CAMARILLO YEARS (1992-1994)

In the fall of 1991, efforts were intensified to find an appropriate site for the WFVZ, since Harrison appeared to be nearing completion of an agreement to sell his office building, where many of the foundation holdings were located. Sam Sumida and I set about searching for a suitable structure that could be leased or even purchased, now a possibility with the addition of the BWF resources. The search, which involved the inspection of over 100 commercial buildings, started in West Los Angeles and eventually moved north to semi-rural Ventura County in our efforts to balance the factors of affordability, suitability, and "reachability" from Los Angeles, the site of the nearest international airport.

An appropriate 22,000-sq ft building was finally found on the outskirts of the small town of Camarillo, and it was purchased jointly by the BWF and WFVZ in February 1992. The move of the entire WFVZ collections and business office was accomplished by six WFVZ staff members over the next five months, often using small trucks that could hold only a few specimen cabinets at a time. Over 600 specimen cabinets containing more than 800,000 empty eggshells, bird nests, and bird skins were moved without apparent damage.

The new building contains a single large room of 17,000 sq ft that allows the entire WFVZ collections to be housed without stacking the specimen cabinets, a great luxury for both researchers and staff, and the library is housed in extensive shelving installed immediately adjacent to the collection. The remainder of the building is devoted to administrative and research offices and storage.

Following the departure from the LACMNH, the WFVZ was again on its own financially, drawing on income from its own modest endowment, which had been established with bequests from the estates of Jean Delacour and Gladys Crail, and the larger infusion from Bleitz's curious array of investments, which included traditional bonds, collectibles, and an assortment of real estate, including the proverbial desert property. Although these assets were converted to liquid form as soon as possible, the resulting funds were only sufficient to cover WFVZ salaries, but not enough to support specific research projects or the publications. Thus, the staff turned to other sources of funding, including contracts and agency subsidies of specific WFVZ publications, to maintain the programs of the WFVZ.

Numerous opportunities for obtaining contracts to conduct environmental studies were available in California in the early 1990s. Within only a few months after the move to Camarillo, the WFVZ had eight full-time biologists on its staff, working on an array of studies supported by governmental agencies, military branches, and the private sector. The principal projects administered by the WFVZ during the period from 1992-1994 included a long-term study on the population dynamics of the raptor community of the huge Rancho Mission Viejo in Orange County, California, directed by Peter H. Bloom (Bloom and McCrary 1996), the San Clemente

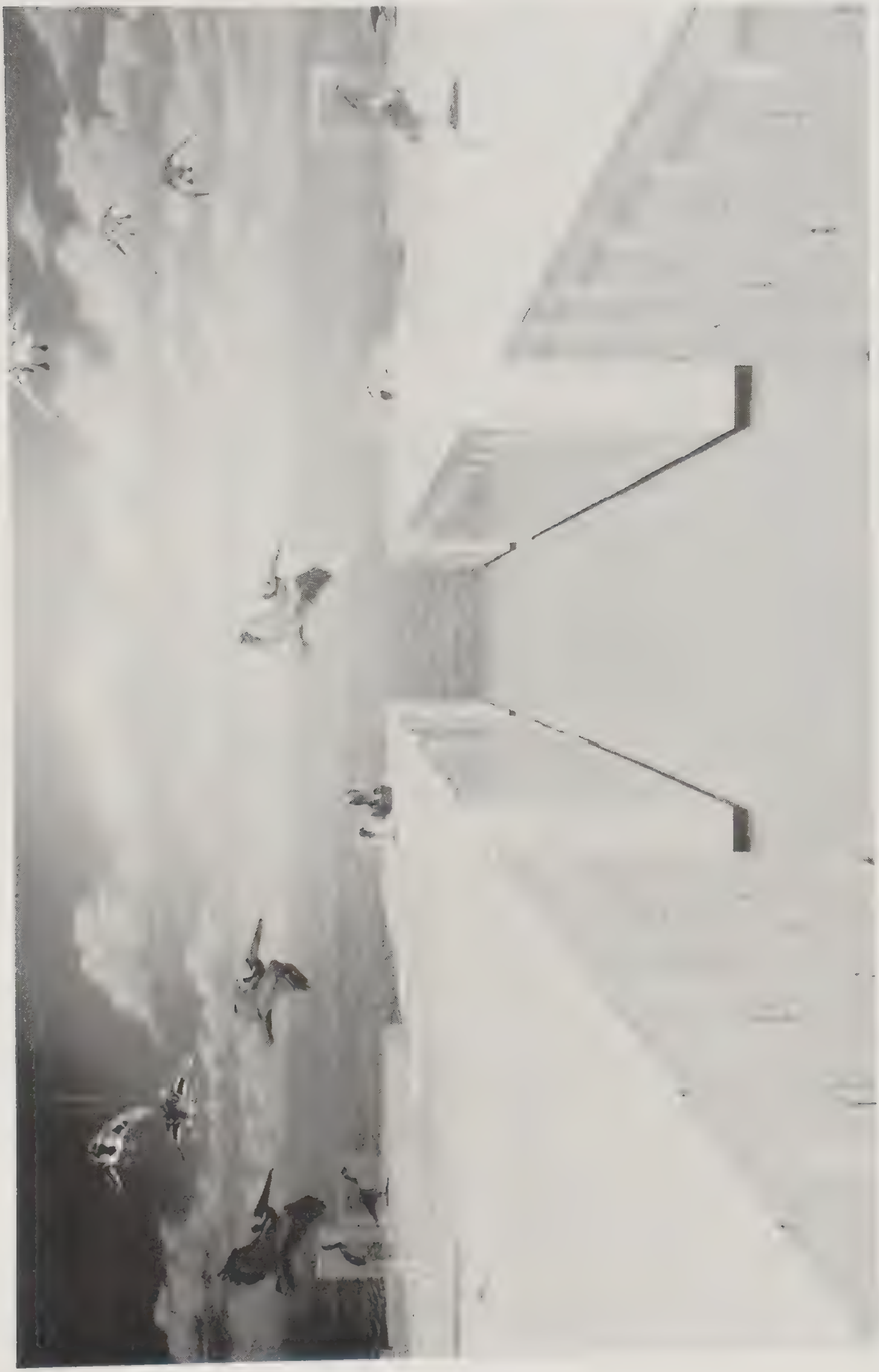

Fig. 14. A view of a portion of the present collection range of the Western Foundation of Vertebrate Zoology. Photograph by Sam Sumida.

Loggerhead Shrike recovery program, initially directed by Michael Morrison and later by William T. Everett (Morrison et al. 1995), and a study of eggshell quality of birds breeding on the California Channel Islands in connection with a large Superfund case (the "Montrose Case") under my direction. Numerous other smaller contracts began flowing through the WFVZ, and the organization began to take on the appearance of an environmental consulting firm. While there was a tendency for these ventures to draw the WFVZ away from its traditional museum mode, they presented new opportunities to apply specimens, especially eggs, and their associated data to the solution of contemporary conservation problems, adding new justification for preserving the WFVZ collections and those of other natural history museums.

In an era when traditional natural history museums are forced to compete for the "entertainment dollar," there is ever-increasing emphasis on exhibits and education programs, often at the expense of research and collections maintenance, activities that are not constantly before the general public. The WFVZ differs from the conventional model, however, since its main focus has always been on collections. The WFVZ mission statement emphasizes this by stating that the foundation's business "is to acquire, integrate, and preserve ornithological collections, to support original research on birds, to promote the conservation of birds, and to publish scientific findings." In the future, the creation of other facilities with a similar emphasis on collections for their own sake may be the best societal solution for preserving collections and promoting their efficient use. When that time comes, perhaps the unusual history of the WFVZ may provide some useful lessons.

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7

The Canadian Wildlife Service and Ornithology

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Abstract.—The Canadian Wildlife Service (CWS) was the Canadian federal government's evolving reaction to responsibilities for conservation of migratory birds assigned to it under international treaty (in 1916). Work on birds expanded from enforcement of regulations and conservation education to include research on problems affecting or caused by birds as well as on breeding biology and ecology. The "Wildlife Service" name emerged in 1947, after 30 years of gradual growth in the agency and its efforts. Until the 1960s, waterfowl dominated CWS bird work. The Service then expanded into new fields: study of effects of toxic substances on wildlife; classification and protection of wetland habitats; gathering information and monitoring numbers of other groups of birds (seabirds, shorebirds, landbirds); and new publications both for scientific and public audiences. Expansion of knowledge of birds was more than matched by an explosion of demands for bird information to be used in environmental impact assessments, which were dominant influences directing CWS work in the 1970s. A greater international role for CWS developed with its expanded capability, the North American Waterfowl Management Plan and associated joint ventures, and the Western Hemisphere Shorebird Reserve Network (now part of Wetlands for the Americas) emerging in the 1980s with major input by CWS personnel.

Transfer in 1973 of CWS to a newly created Environment department led to departmental reorganizations tending to submerge CWS identity. Ornithological work continued, with accumulated information allowing wide-ranging summaries, modeling exercises, and conservation proposals unimagined 40 years ago. In 1997 CWS celebrated 50 years of productive work under the Wildlife Service name. The agency still has birds among its major subjects, but wider conservation and biodi-

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versity issues now occupy more CWS staff effort than studies dealing directly with birds.

Major accomplishments in bird conservation over the past 80 years, many also involving efforts of other agencies, included protection that allowed recovery of many formerly reduced species, and enjoyment of birds by vast numbers of people in addition to traditional use by sport and subsistence hunters. Bird study provided information on numbers, movements, and ecology, making possible management of human activities to allow birds to co-exist on a people-dominated planet. Not all "progress" has been good. Gulls and geese increased with protection to current pest status in some areas. New "wonder chemicals" posed unforeseen hazards to birds, taking years to document and mitigate. With wide public support, CWS continues to assemble information needed to enable continued survival and enjoyment of birds in the future.

When Canada achieved self-government in 1867, jurisdiction over birds, with other natural resources, was assigned to the provinces. Provincial administrations allowed ongoing exploitation of birds, without considering that the same populations of birds were also exploited elsewhere during migration and winter. Consequent overexploitation and the decimation of some populations led to international agreements for regulating use of birds to sustainable levels.

The Migratory Birds Convention, signed by Great Britain (for Canada) and the United States of America (USA) in 1916, became law in Canada under the Migratory Birds Convention Act of 1917. That legislation took precedence over provincial statutes, which might be more restrictive but could not be more permissive than federal regulations. A federal presence was required in migratory bird management, and the agency created for that purpose evolved into the Canadian Wildlife Service (CWS). This account examines the role of CWS in ornithology, as it developed over the 80 years following signing of the Migratory Birds Convention.

Ornithological work carried on within earlier agencies, from which CWS evolved, is all referred to in this chapter as "CWS work." The history of ornithology in CWS is treated in five time periods corresponding to evolving administrative arrangements and included activities.

CWS began as a bird-oriented agency, but other responsibilities, especially for mammals in the national parks and territories, soon were assigned to it. Its enabling legislation made no provision for CWS control of bird habitat (except as sanctuaries) until 1966, and that limitation still influences activities and approaches of CWS. A government agency is restricted by its formal responsibilities, but many of its employees examined wider fields of interest related to their assigned duties.

IMPLEMENTING THE MIGRATORY BIRDS CONVENTION (1918-1947)

The 1916 signing of the Migratory Birds Convention required the Canadian (federal) establishment to regulate how people interact with migratory birds. Federal efforts in enforcement and public education supplemented work of provincial agencies, as traditions of hunting migratory birds and collecting their eggs for food were of long standing in many areas. Communications were slow in 1918, and informing the public remained a direct-contact process for CWS personnel for decades. Before the Convention, the ornithologist at the Victoria Memorial Museum (see Ouellet 1995, Cranmer-Byng 1996) was the only Canadian federal employee directly involved in ornithology.

The people who provided a federal "presence" in ornithology through CWS might be expected to be knowledgeable about birds and their ecology, as well as zealous both in enforcing migratory bird conservation and in educating the public on the need for conserving birds. Such people were rare, however, and the officials responsible for hiring them showed commendable wisdom in accepting that knowledge of birds should be the primary criterion. In 1918-20, four bird enthusiasts were engaged to begin that work.

Hoyes Lloyd (1888-1978), previously a professional chemist and private bird-collector, became Superintendent of Wild Life Protection in Ottawa from 1919, with Chief Federal Migratory Bird Officers in regional roles. Robie Tufts (1884-1982) of Wolfville, Nova Scotia, served the Maritime Provinces, and James A. Munro (1884-1958) of Okanagan Landing, British Columbia, was initially responsible for all of western Canada. Both had derived parts of their earlier incomes from collecting and selling bird specimens and eggs to private collectors. Harrison Lewis (1893-1974), stationed in Ottawa and responsible for bird work in Québec and Ontario, was the only one except Lloyd with university training. After 1934, the west was divided. Dewey Soper (1893-1982), another professional collector, assumed responsibility for bird work in the prairies, with his base in Winnipeg, Manitoba. From the first years, all were active in spreading the message of migratory bird conservation through regulation and knowledge. Not surprisingly, their differing backgrounds and temperaments led them into divergent roles.

Enforcement of regulations, to reduce excessive take of birds or eggs, was a primary need in the Maritime Provinces, where the provincial governments at first were uncooperative. Educating the public was a means to that end, and Tufts devoted most of his effort to those tasks. After respon sibility for enforcement was transferred to the Royal Canadian Mounted Police (RCMP) in 1932, he had more time for collecting specimens and observations, and his publications (mostly locality records) led eventually to his book *The Birds of Nova Scotia* (Tufts 1962), published long after his retirement (Godfrey 1984).

From the start, Lewis was directly involved in enforcement on the north shore of the Gulf of St. Lawrence, "Audubon's Labrador." Through surveys, enforcement, establishment of bird sanctuaries, and publication of summaries and status reports, he worked to restore the seabird populations of that region, which had been decimated by over-exploitation during the previous century. Data on cormorants (not protected by the Convention, and thus outside his official responsibilities) contributed to his advanced degrees (Lewis 1929). Stationed at the agency headquarters when not in the field, he gradually assumed administrative roles, and succeeded as head of the bird unit on Lloyd's retirement in 1944 (Solman 1974).

Munro's approach differed, reflecting perhaps less pressing needs for enforcement, as exploited species had not yet dwindled to the degree seen in the long-settled east. Although a collector throughout his career, his collections were coupled from the start with life-history and ecological observations. Some of his remarkable series of publications "Studies of Waterfowl in British Columbia" (1923-49) remained authoritative sources for 40 years (Baillie 1969), and his summary of the province's avifauna (Munro and Cowan 1947) was not superseded until the 1990s.

Soper was an explorer at heart, and his work was more focused on birds before he joined CWS than afterwards. His explorations for then-unknown northern breeding areas of the Blue Goose (*Chen caerulescens*; Soper 1929) and Whooping Crane (*Grus americana*; Soper 1942) were notable. Under CWS, his work was increasingly focused in the national parks, and faunal in nature. Coming into CWS after the RCMP took over enforcement in 1932, his involvement in that field was minor, but his investigations and publications continued long after his formal retirement in 1952 (see Soper and Beck 1983).

Enforcement work in the early period focused on hunted species, which among migratory birds mostly meant waterfowl. Long-standing practices, originating in subsistence economies, of exploiting any bird which might be used, and killing others deemed to compete with human objectives, spread CWS attention more widely across the bird world. The government and private waterfowl initiatives that arose during the 1930s in the USA—including northern surveys, National Wildlife Refuges, "duck stamps," the Delta Waterfowl Station, and Ducks Unlimited, were not (then) duplicated in Canada. The responsible Canadian agency had only five professional staff spaced 1000 km or more apart across Canada.

The CWS headquarters was involved in liaison with international bird conservation initiatives from its start. Hoyes Lloyd represented Canada at meetings of the International Committee (later Council) for Bird Preservation (ICBP) from the 1920s, and took part in meetings of the North American Game Conference (now N. Am. Wildlife and Natural Resources Conf.) from its start in 1934. Concern in the USA over dwindling duck populations during the prairie droughts of the 1930s saw U.S. government biologists sent north annually into Canada. They "touched base" with CWS representatives, to whom professional visitors with shared interests were a very welcome novelty.

The work of the few CWS men, especially those stationed far from Ottawa (base of the federal government and National Museum), was fundamental in raising public awareness of birds as subjects of interest and concern—rather than merely as food or mobile targets. Early CWS enforcement efforts laid the groundwork for recovery of most exploited bird species, which continued through the first half-century after the 1916 Migratory Birds Convention came into effect. CWS personnel had to fit investigative work among ongoing enforcement, education, inventory, or administrative duties. Because of the incomplete state of ornithological knowledge in Canada in 1920 (compare Taverner 1919), much early CWS investigative work was inventory, cataloguing "what's where and how many," often documented by collected specimens as well as field-notes, thus paralleling and extending the ongoing work of Canada's national museum (see Ouellet 1995).

A WILDLIFE SERVICE FOR CANADA (1947-1962)

The Great Depression and World War II had less immediate impact on CWS activities, including ornithology, than on those of some government agencies. None of the five "grand old men" volunteered for military service in WW II, and all retired between 1943 and 1952. The war over, capable university-trained men filled new openings in CWS. Infusion of young men with both university training in biology and executive experience in the armed forces changed the character of the agency greatly. By then CWS had specialists in limnology and pathology as well as birds and mammals, so the USA example was followed in renaming it Dominion Wildlife Service (1947) and Canadian Wildlife Service (1950).

CWS personnel working in ornithology increased from four in 1945 to a dozen by 1950, with field offices in most provinces, including Newfoundland, Canada's tenth province, from 1949. Some of the new staff moved up through CWS into higher management positions, which took them away from direct contact with birds, the interest that first brought them to CWS. A few resisted promotion to continue field work. CWS biologists in field offices had to be "self-starters" and strong-minded to be effective with minimal supervision. Instructions from headquarters covered more activities than could be fitted into anyone's time, and people who didn't set priorities became swamped in half-finished tasks. Some active CWS biologists from that period left no record beyond a few unpublished reports, but others produced significant publications (e.g., Munro 1950, Cooch 1955, Barry 1962, Gollop 1963) that began to establish CWS as a primary agent for ornithological research in Canada.

Expansion of CWS staff in the late 1940s saw its bird work become more focused on waterfowl than before or since, responding to perceived declines in duck numbers (after some recovery from a drought-driven low in the 1930s). Waterfowl survey work in Canada was at first coordinated from the USA, where most duck hunting took place, although most waterfowl were reared in Canada. Maintaining sufficiently obvious Canadian participation in waterfowl surveys (to head off assertions that Americans were being allowed to take over Canadian waterfowl resources) involved most new and old CWS ornithologists from the start. The first published summaries (e.g., Williams et al. 1948, Crissey and others 1949) included accounts by George Boyer, Graham Cooch, Oliver Hewitt, David Munro, James Munro, Dewey Soper, George Stirrett, John Tener, and Victor Solman, of CWS. Attempts to track trends in duck numbers and productivity, in hopes of adjusting waterfowl kill within available stocks (the game management approach then taught in universities; Leopold 1933), had limited success. Migratory birds such as waterfowl were also influenced by factors acting far away from the breeding grounds where most monitoring was attempted. Scarcity of resources limited much CWS monitoring to local "hot-spots" that often did not fully represent the wider picture. Much information then assembled was never published, but what survived in files, reports, and in the memories of early field workers, proved valuable when syntheses became feasible many years later (e.g., Canadian Wildlife Service 1981).

In the 1950s, all field staff were directed to take part in seasonal waterfowl surveys, and some also were involved in large-scale banding of ducks and geese. Some time remained for focused research on waterfowl, including work towards advanced degrees. These often included banding studies, at that time the only means of tracing movements of individual birds. CWS studies of arctic-nesting geese began in the 1950s (Barry 1956, Cooch 1958, Lemieux 1959) and continued to the present, with an enviable publication record. Other studies towards advanced degrees within CWS had mixed success, depending on logistics and individual temperaments; theses on Trumpeter Swan (*Cygnus buccinator*) and Lesser Scaup (*Aythya affinis*) remained uncompleted, and those based on studies of American Black Duck (*Anas rubripes*; Boyer 1951) and Common Goldeneye (*Bucephala clangula*; Carter 1958) were too local to be definitive. The idea that a substantial body of banding recoveries was sufficient data for a thesis or dissertation died hard, and some early CWS work towards advanced degrees was long in gestation or published otherwise (Moisan et al. 1967, Dzubin and Gollop 1972). Overall, waterfowl species studies within CWS contributed substantially to the mass of published and unpublished information that made up "conventional wisdom" about these birds [summarized briefly by Linduska (1964), including 8 chapters (co-)authored by CWS biologists]. Through the 1950s the new Canadian service became accepted as a full partner in North American waterfowl management.

In Newfoundland, centuries of exploitation had decimated waterfowl stocks. The major hunted species of migratory birds in the 20th century, Common and Thick-billed murres (*Uria aalge* and *U. lomvia*), could not be legally hunted under the Migratory Birds Convention. Leslie Tuck, first CWS representative on "The Rock," undertook wide-ranging studies of murres (Tuck 1961) to provide information for management of the "turr" hunt, and his work helped lay the basis for the productive CWS seabird program that emerged later. Tuck also pioneered CWS work in shorebirds, the Common Snipe (*Gallinago gallinago*) being a game bird more sought in Newfoundland than elsewhere in Canada.

CWS responsibility included all migratory birds, but little time was spared before 1965 for work on species that were not hunted or otherwise under obvious threat. Few focused bird studies from the 1940s and 1950s reached publication (e.g., Pimlott 1952), although avifaunal works emerged from observations peripheral to waterfowl or mammal work (Mowat and Lawrie 1955, McEwan 1957, Tuck and Lemieux 1959). "Wildlife" remained nearly synonymous with game species into the 1960s, and CWS sometimes was referred to—only partly in jest—as the Canadian Waterfowl Service.

Certainly waterfowl work dominated CWS activities in the 1947-62 period, as increased staff and resources in this country barely kept pace with U.S. Fish and Wildlife Service (USFWS) plans for more waterfowl work in Canada. Most CWS personnel had wider bird interests, but these could be pursued then only after waterfowl responsibilities had been satisfied.

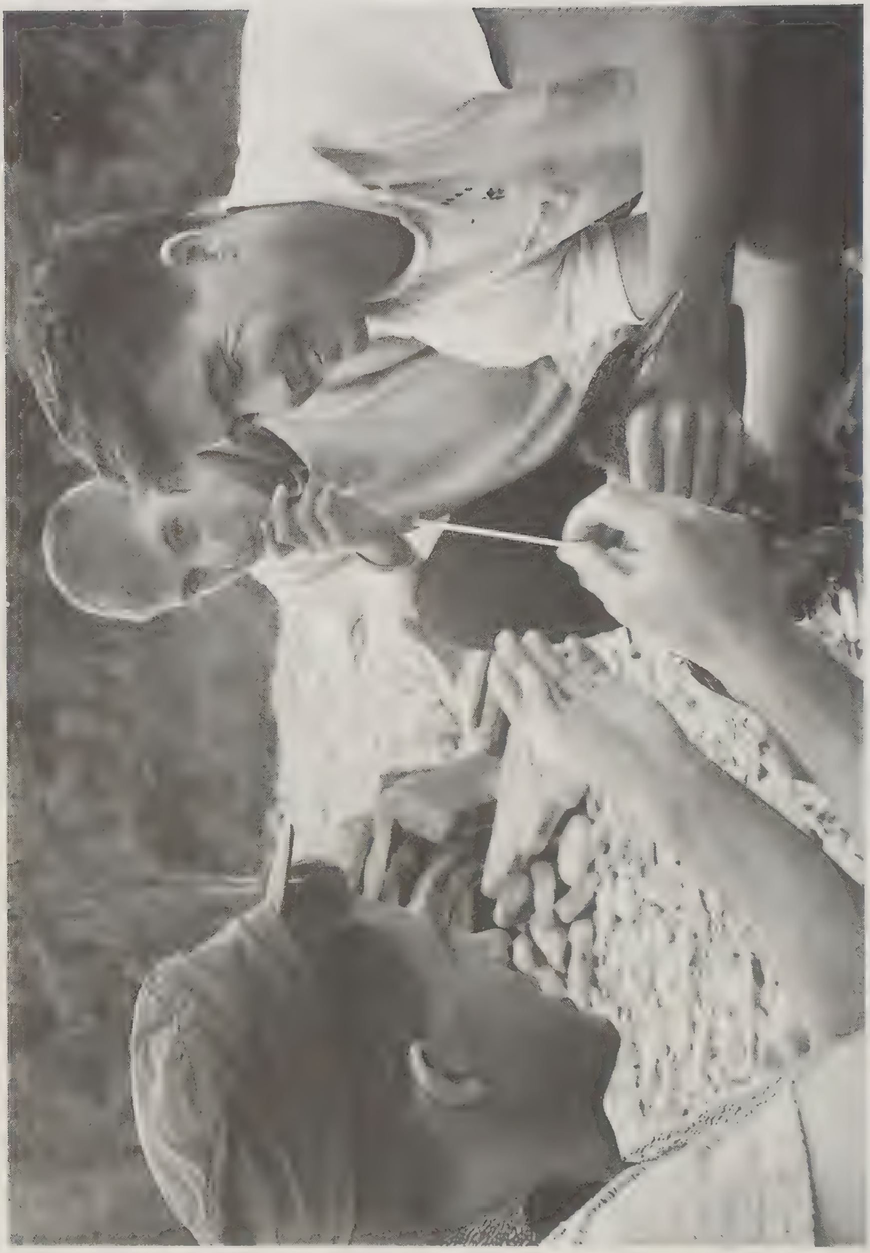

Fig. 1. Mergansers as predators on young Atlantic salmon. Left to right: A. J. Erskine measuring young Common Merganser, trapped and banded on Middle River, Nova Scotia, 1966 with seasonal assistants A. Doucet and W. Carroll (photo by A. H. Macpherson).

EXPANDED RESPONSIBILITIES AND MORE STAFF (1962-1975)

By the early 1960s, CWS was poised for major expansion. In 1962 management was divided between Western and Eastern regions, headquartered in Edmonton and Ottawa, respectively. Field officers thereafter were assigned to research or to operations, but most investigative work continued to be conducted from field offices with only indirect supervision.

CWS publications began to assume a higher profile. The modest "wildlife management bulletins" of the 1950s were superseded by new and eye-catching series, intended to inform the public as well as scientists. The first CWS Monograph, a book on murres (Tuck 1961), was received enthusiastically, earning professional acceptance as an authoritative work and receiving a prestigious award from The Wildlife Society. It was followed by a new CWS Report Series, the first issue summarizing surveys on the Whooping Crane (Novakowski 1966), a high-profile endangered species on which restoration efforts through CWS and USFWS collaboration began in 1956. Other, less pretentious CWS series, Occasional Papers and Progress Notes, also took shape in the 1960s. These became outlets for technical and interim reports, mostly directed to working-level scientists. (All these series also included publications on topics outside of ornithology.) CWS publications, however, remained unfamiliar and often difficult of access for university people, and for most ornithologists in the USA. Some Canadian academics belittled those series as "not subjected to peer review" (implying that they were "unscientific"), despite most having passed review(s), for content as well as policy, by several levels of supervisors who were all trained biologists.

CWS bird work in the 1960s expanded into major new subject areas, including studies of impacts of toxic substances on birds and other wildlife. That need was recognized a decade earlier, but a suitable leader to establish the program proved hard to find. When Graham Cooch, then eastern Arctic ornithologist, suffered a heart attack in the field in 1962 (at age 34), CWS management declined to accept responsibility for allowing him to go north again, and assigned him to start a toxics program for the Service. Among the first problems addressed were side-effects on birds of spraying forests with DDT (and other chemicals) to control damage by spruce budworm (*Choristoneura fumiferana*) in eastern Canada, begun in Ontario in 1945 and ongoing in New Brunswick since 1952. Another was the collapse of some North American raptor populations, also owing to DDT, documented for Peregrine Falcons (*Falco peregrinus*) at a 1965 conference in Madison, Wisconsin (Hickey 1969). Much early pesticides work was done

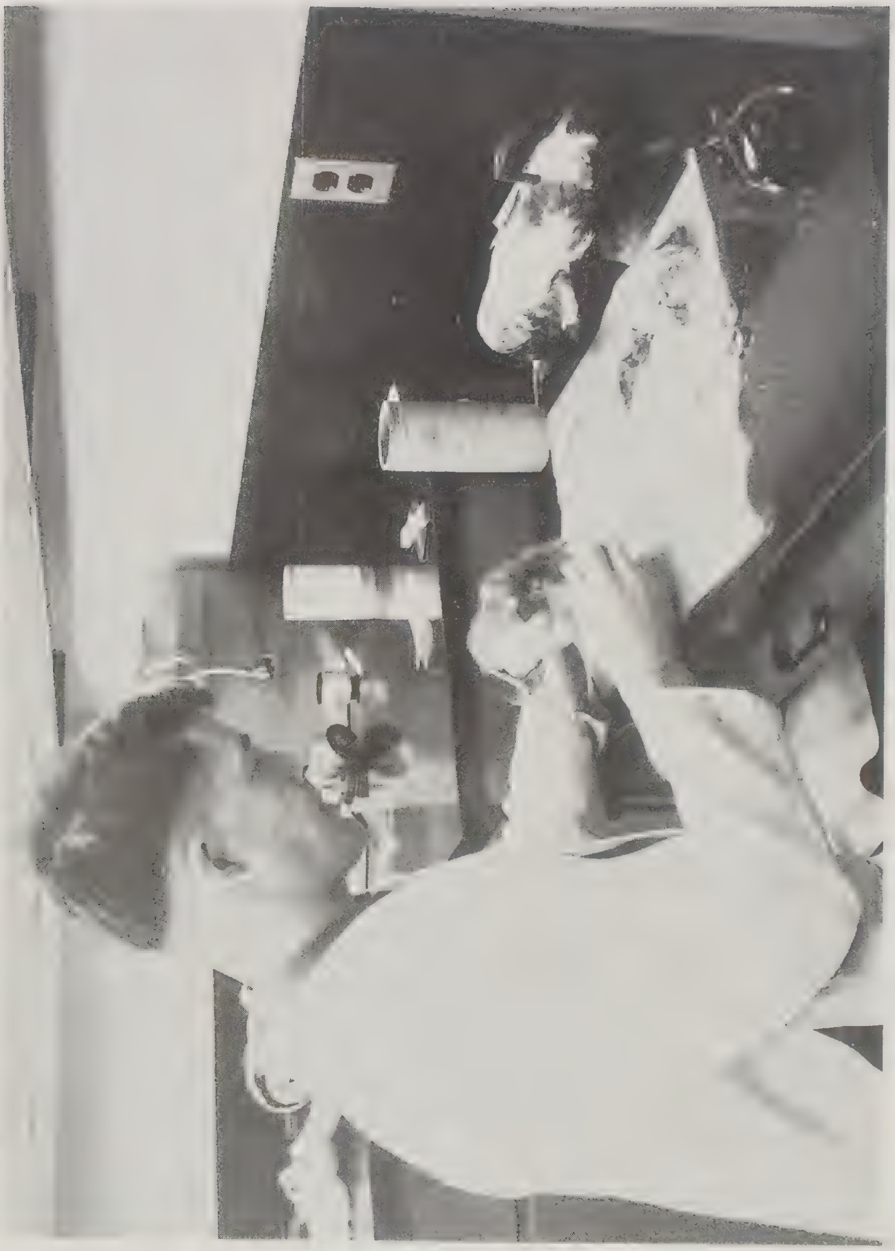

Fig. 2. A. J. Erskine skinning young Common Merganser, shot by Fisheries crew on Margaree River, Nova Scotia, 1967 (photo by A. D. Smith).

on contract (e.g., Fowle 1972), but from 1967 CWS employed staff biologists in field positions on both those studies (Fyfe et al. 1969, Cade and Fyfe 1970). Toxics work on water birds, especially Herring Gulls (*Larus argentatus*) and Common Terns (*Sterna hirundo*) in the highly polluted Great Lakes, also began around 1970 and continued to expand into the 1980s (for an early summary of CWS and other toxics work on birds, see Keith and Gruchy 1972). CWS examination of effects of marine oil pollution also increased, following several major oil spills off eastern Canada (Brown et al. 1973; also reviews by Vermeer and Anweiler 1975, Vermeer and Vermeer 1975).

CWS became more directly involved with migratory bird habitat, mainly wetlands, during the 1960s. The Canada Land Inventory (CLI), a database for land-use planning, involved classifying all lands north to the limits of roads by their capability for agriculture, forestry, recreation, and wildlife—the latter restricted to waterfowl and wild ungulates (Solman 1973). CWS received several new staff positions for CLI work on wetlands, and research on wetland habitat classification and capability expanded concurrently (Dirschl et al. 1974, Millar 1976). At the same time, wetland acquisitions by CWS were initiated to ensure preservation and management of certain significant wetlands, and to obtain sites where experimental manipulation of habitat to enhance use by waterfowl could be studied (e.g., Whitman 1976). Land acquisition by CWS, not foreseen in its original mandate, was first authorized under a Ministerial Statement in 1966, and formalized by the Canada Wildlife Act in 1973. Canada's Migratory Bird Sanctuary network was greatly expanded by designation of major arctic areas (mostly with goose breeding colonies and molting areas) at that time.

Waterfowl and other game bird surveys and banding continued along with the new habitat initiatives. Whereas in the USA "duck stamps," since the 1930s, provided a sampling base for measuring waterfowl harvest and hunter activity there, Canada's earlier waterfowl hunter sampling had relied on provincial small-game permit stubs, which were different in each province and which became available for CWS use only a year after issuance. In 1966, CWS introduced a national Migratory Game Bird Hunting Permit, required of all people hunting any migratory birds (including American Woodcock *Scolopax minor*, snipe, Mourning Dove *Zenaida macroura*, etc., which could not be sampled by U.S. duck stamps; see Dobell 1972). In 1967 the first Canadian national migratory bird harvest surveys and collections of wings from harvested game birds began, and procedures were refined over the next decade (Benson 1971, Boyd and Finney 1978).

In 1964, David Munro succeeded W. W. Mair as Director of CWS, and he chose Graham Cooch to succeed him as Chief Ornithologist. Munro and

Cooch, two strong-willed individuals, were sometimes at loggerheads, but both made things happen, including greatly expanding CWS work in ornithology. Early in 1967, Hugh Boyd, long-time leader in waterfowl research at The Severn Wildfowl Trust in England, came to CWS, initially as supervisor of bird research in the Eastern Region. Boyd was hired for his waterfowl expertise, which was and remained immensely valuable to CWS (e.g., Boyd 1974), but from his arrival he too worked to expand the scope of CWS bird studies beyond waterfowl. A year later, Boyd approved transfer of A. J. Erskine from waterfowl research into coordinating non-game bird studies nationally for CWS (e.g., Erskine 1977, 1978). Boyd later transferred R. G. B. Brown from work on bird damage to Niagara fruit crops to studying seabirds at sea (e.g., Brown et al. 1975). Other new work begun in the Eastern Region, soon after 1970, was research at seabird colonies led by David Nettleship, and studies of migrant shorebirds by Guy Morrison. Work by these latter at first involved wide-ranging surveys, some with broader conservation spin-offs (e.g., Nettleship 1974, Nettleship and Smith 1975, Morrison and Harrington 1979), before they moved into intensive studies of the major species. By the early 1970s, CWS had expanded in both scope of work and in personnel and was recognized as the principal bird research institution in Canada.

Cooch ensured that his earlier arctic goose studies were continued. CWS provided core funding that allowed Fred Cooke, then population geneticist at Queen's University, to begin long-term Snow Goose (*Chen caerulescens*) studies at La Perouse Bay near Churchill, Manitoba (Cooke and Cooch 1968, Cooke et al. 1995). Surveys and studies encompassed other Snow Goose and Ross' Goose (*Chen rossii*) colonies (e.g., Ryder 1967, Kerbes 1975) and movements (e.g., Dzubin 1965), and those activities have continued ever since.

Much CWS research on waterfowl and other wetland species, begun earlier, was completed and published during that period. Monographs on Buffleheads (*Bucephala albeola*; Erskine 1972a) and the snipes (Tuck 1972), both recognized by The Wildlife Society (Honorable Mention, and Award, respectively), and reports from thesis studies on cranes and ducks (Stephen 1967, Sugden 1973, Poston 1974) appeared in CWS publication series. Damage to prairie grain crops by waterfowl, an ongoing problem (see Munro 1950, Colls 1951), continued to require study (Sugden 1976). Investigations of perceived problems with birds often provided less clear-cut solutions, as with aircraft damaged by bird strikes (Anonymous 1971, Blokpoel 1976) and mergansers as predators on young salmon (Erskine 1972b).

CWS involvement in waterfowl population monitoring was relatively less in the 1965-75 period than before or later. Monitoring of arctic goose populations continued, but filling gaps in existing USFWS aerial duck survey coverage of southern Canada would have demanded more resources than were then deployed in all CWS waterfowl activities. Research was judged to be better use of the limited money than monitoring. Such surveys, once begun, are an ongoing demand on resources, and CWS had learned from earlier attempts that small and localized sampling was inadequate for monitoring its widespread, low-density breeding waterfowl populations. Duck banding in eastern Canada, however, increased greatly under a cooperative agreement with the U.S. Fish and Wildlife Service and Atlantic Flyway states, starting in 1965.

Meanwhile, the "environmental movement" was building in the outside world, with demands that led in 1970 to creation of a (Canadian) federal Department of Environment. That new agency brought together various units dealing with the natural world, including CWS. Re-alignment of regional groupings in associated agencies within the department forced CWS to adopt a five-region structure in 1975.

One of the first new activities to emerge from demands by the environmental movement, starting well before Environment Canada was established, was "environmental impact assessment" (EIA). Demands for EIAs, whether for spraying or disposal of chemicals (authorized pollution) or for industrial or commercial developments (habitat alteration or destruction), spawned environmental consulting companies by the score. Such companies used existing "free" data wherever possible, and for bird data that often meant drawing on CWS files. This same agency was also being asked to judge completed EIAs. The early 1970s saw CWS personnel at regional levels undertaking wide-ranging surveys in order to be prepared for the EIA process. That complex activity peaked in the following period, but the need for it remains high.

Demand for EIAs was among the earliest public recognition that hunting of game species was not the only human threat to wildlife in Canada. It was accompanied by greatly expanded public interest in birds, in which CWS played a significant role. The "Hinterland Who's Who" series of pamphlets on birds and other wildlife, advertised on television beginning in the mid-1960s, raised public awareness of the organization and fostered interest in birds. Bird-watching in the 1960s began to be seen as "respectable" recreation rather than an amusing eccentricity, and CWS work on nongame birds from its start depended largely on volunteer observers in data-collection and monitoring schemes.

Much bird work by CWS is in channels not leading to scientific or technical publications. CWS personnel were involved in the Committee on Status of Endangered Wildlife in Canada from its start in the 1970s. Assigning status—as endangered, threatened, vulnerable, etc.—to various taxa, including birds, eventually went far beyond the short lists first published (Godfrey 1970). Reducing bird activity around airports, as a contribution to air safety, involved CWS personnel and contractors for years following the widely publicized crash of an airliner that struck birds near Logan Airport (Boston, Massachusetts) in 1960. Regulation of the use made of birds by hunters, scientists, and others, depends mostly on voluntary compliance, but an enforcement "presence" is essential to demonstrate that the need for compliance is taken seriously. From the late 1960s, CWS engaged staff to coordinate efforts of the RCMP and provincial personnel in enforcing migratory bird regulations.

CWS contributions to ornithology in the 1962-1975 period may be summed up as expansion of research capability to include all birds and the study of chemical pollution of ecosystems on which birds depend. The demands for EIAs also drew upon data resulting from CWS investigative work, even when the scientists involved considered the results only suggestive.

INTERNATIONALISM AND CONSOLIDATION (1975-1985)

CWS continued to grow in personnel and other resources through the mid-1970s. The agency earned international recognition for its bird (and other) research, which continued to develop despite some resentment over credit given to this minor agency (CWS) rather than to the department in which it was placed.

One major challenge for CWS bird people was the demand, arising from pressure by Ducks Unlimited (DU) on the U.S. Fish and Wildlife Service, for Canadian input to a North American waterfowl management plan. A (USFWS) waterfowl plan had gone through a dozen drafts in the previous 15 years, while CWS considered such planning premature because of the fragmented knowledge of waterfowl in Canada—especially in its forested hinterlands. Despite these misgivings, CWS migratory bird managers assembled in January 1978 to discuss possible approaches, and within four months developed a crude but usable population model of Canada's summer waterfowl numbers. Developing a Canadian waterfowl management plan (Canadian Wildlife Service 1981) took another three years. James Patterson played the lead role in drafting that document and negotiating the North American Waterfowl Management Plan (NAWMP, signed off in 1986), which relied on the assembled Canadian waterfowl population data. Cross-country collaboration among CWS regions reached a high point during the waterfowl planning exercise, drawing on "con-

Fig. 3. Seabird populations and demographics. Lunch break during survey of breeding kittiwakes and cormorants, Big Lorraine, Nova Scotia, 1983; A. R. Lock (center) with seasonal assistants M. Malone (left) and T. Currie (photo by A. J. E.).

ventional wisdom" along with the accumulated scientific expertise of regional scientists.

CWS investigations on waterfowl by then were shifting from basic species biology to applied research and management. Studies of northern geese extended into the high Arctic in connection with petroleum exploration there (e.g., Boyd and Maltby 1979, Reed and Chagnon 1987). Crop damage by waterfowl remained an issue (e.g., Reed et al. 1977, Sugden and Goerzen 1979). Even more effort went into examining wetland habitat relationships, the DU message "Habitat is the key" having been accepted widely, but few conclusive results emerged in that research line for several years (Adams and Gentle 1978).

From the mid-1970s, seabirds became a major focus of CWS bird research and also of work on effects of toxic chemicals. The colonial breeding habits of seabirds placed them at risk to ever-more-frequent disturbances to the marine environment (especially from petroleum explo-

Fig. 4. A cold day during Thick-billed Murre banding, Coats Island, N.W.T., 1985; l-r, D. Noble, A. J. Erskine, R. D. Elliot, and J. S. Wendt (photo by J. S. Wendt).

ration and transport) and seabird habits also made it relatively easy to secure the large samples needed for statistical testing of effects. Major baseline studies of demography in alcid communities were organized by David Nettleship and A. J. Gaston at high Arctic (Gaston and Nettleship 1981) and low Arctic sites (Gaston et al. 1985, Birkhead and Nettleship 1987), as well as intensive censuses of other major colonies throughout eastern Canada. Waterbird colony inventories continued around the Great Lakes (e.g., Blokpoel 1977, Blokpoel et al. 1980) in connection with intensive investigations of the effects of toxic chemicals and other bird problems (e.g., Blokpoel and Tessier 1986).

CWS toxics work, overseen in turn by Cooch and Keith, originally focused on field studies of birds, rather than major laboratory investigations as done by the U.S. Fish and Wildlife Service. With the arrival in about 1972 of a qualified leader, David Peakall, CWS moved into larger-scale and more intensive toxics studies in the field, with laboratory studies complementing field work, focusing on Herring Gulls and Common Terns

Fig. 5. Eider energetics. Pause during banding and census of nesting female Common Eiders, The Wolves (islands), New Brunswick, P. Hicklin (left) and S. Gilliland, 1986 (photo by A. J. E.).

in the extensively polluted lower Great Lakes. Early studies showed the serious extent of pollution (e.g., Gilbertson et al. 1976, Gilman et al. 1977, Mineau et al. 1984), but monitoring the clean-up effort still continued 20 years later. Toxics work on raptors and forest songbirds also continued (e.g., Peakall and Kiff 1979, Peakall and Bart 1983), and study of physiological mechanisms contributed to basic understanding of toxics effects (e.g., Peakall et al. 1973, 1983). Monitoring pesticide burdens in various bird species was ongoing.

A new environmental issue affecting birds, that emerged in the late 1970s, was the acidification of wetlands by "acid rain." This resulted from industrial and automotive emissions of sulfur and nitrogen oxides, often originating in distant regions and transported in rain clouds for hundreds or thousands of kilometers. The early work was mostly limnological and chemical monitoring, documenting acidification, but indirect effects on birds were soon confirmed (e.g., DesGranges and Darveau 1985, McNicol et al. 1987).

Toxic substances and petroleum pollution were only some of the environmental impacts. By the late 1970s CWS was swamped by EIA demands, including many that bypassed CWS national or regional headquarters, when scientists in the field offices had to respond to outside mail and phone-calls instead of conducting and writing-up research. A major effect of instant communication was thus to reduce drastically the time available for original investigative work and critical review of results by CWS bird professionals.

Nevertheless, a wide variety of bird work continued, although people assembling multi-author compilations covering broad fields often found work on a single publication extending over five or more years (Reed 1986, Erskine 1987). Summaries of extensive survey work on various groups of birds appeared from all regions (Vermeer et al. 1983, Morrison 1984, Curtis et al. 1985, Lehoux et al. 1985). Monographs of species or families by then were usually published externally (e.g., Nettleship and Birkhead 1985), and a wide variety of shorter papers appeared in the periodical literature (e.g., Erskine 1980, Savard 1982, Ross 1983, Brown and Nettleship 1984, Forbes et al. 1985, Gollop et al. 1986, Chapdelaine et al. 1987, Hicklin 1987, Sugden et al. 1988.

Fig. 6. Shorebird feeding ecology. Returning from sampling sediments and invertebrates in Minudie mudflats, Nova Scotia, 1978 (photo by A. J. E.).

In autumn 1984 "the sky fell" on CWS. Twenty percent of CWS personnel received lay-off notices without prior warning on 9 November. Migratory birds work in CWS, having a strong legislated mandate, was supposedly exempted from these cuts, but all bird personnel in term positions were released in order to "rescue" people in continuing positions that had been laid off. The 1984 cuts took effect 31 March 1985. Continuation of CWS work was perceived by its staff, at the time, as more important than the structure under which it functioned. During the next decade, reorganizations within Environment Canada submerged the CWS name within broader groupings in most regions. At the working level, most staff still consider themselves employees of CWS. Most aspects of the migratory birds program of CWS continued with only minor changes.

A possibly optimistic summary of the situation in the mid-1980s was that CWS had achieved useful levels of expertise with reference to most major bird groups and problems, and predictive capability was steadily emerging from the knowledge accumulated by CWS over the previous 35 years. The 1984-85 cuts, and the bureaucratic framework with which they were associated, damaged morale as well as limiting CWS opportunities for further development of expertise.

Fig. 7. Breeding ecology of Buffleheads. Retrieving truck from ditch during thunderstorm on return from checking nests, Gift Lake, Alberta, 1964; seasonal assistant W. McCrory (photo by A. J. E.).

Fig. 8. Base camp at Gift Lake Metis Colony, Alberta, 1964 (photo by A. J. E.).

THE UNCERTAIN PRESENT AND FUTURE OF CWS (1985-PRESENT)

"Think globally" had been an environmental slogan for years, and international arrangements took on increasing roles in CWS in the 1980s. The North American Waterfowl Management Plan (NAWMP), with its funding arrangements, was formally initiated in 1986, and included more than the prairie habitat restoration program originally contemplated. Joint ventures on arctic geese, Black Ducks, and wetland habitats in eastern Canada and the northeastern U.S. were added to address waterfowl problems not associated with the prairie "duck-basket of the continent"—which within Canada is mainly a regional concern despite its pre-eminence in thinking south of the border. Re-interpreting NAWMP in terms of provincial interests also occupied regional managers for some time. Joint-venture money (mostly made available by U.S. interests) at last made it feasible for CWS to organize systematic waterfowl monitoring of large segments of the low-productivity breeding habitat that characterizes Canada's northern hinterlands.

The population model developed for the Canadian waterfowl plan provided broad-scale population data needed also for designating wetlands for protection under the "Convention on Wetlands of International Importance, Especially as Waterfowl Habitat" (usually called the Ramsar Convention), which was established in 1971, but little used in Canada until the mid-1980s (Gillespie et al. 1991). Another recent agreement for securing blocks of important bird habitat without land acquisition, "Wetlands for the Americas," includes and evolved from a CWS initiative, the "Western Hemisphere Shorebird Reserve Network" (WHSRN), under which the first reserves in Canada and South America were declared in 1987.

On the waterfowl scene, studies of prairie habitat under NAWMP at last began to document relationships long suspected but not previously demonstrated rigorously (e.g., Clark et al. 1986, Clark and Nudds 1991), particularly the incompatibility of intensive monoculture agriculture with the wetland upland habitat mosaics most productive of breeding ducks. Major breeding habitats were catalogued in the prairies (Poston et al. 1990) and also farther north where prairie ducks retreat in dry years (Alexander et al. 1988, 1991). CWS waterfowl management investigations underway for decades on the prairies were summarized and circulated (e.g., Caswell et al. 1987, Hochbaum et al. 1987, Nieman et al. 1987, Turner et al. 1987).

Much accumulated information on migratory bird use of coastal habitats was summarized and interpreted in this period, especially in British Columbia, but also on the east coast (Butler and Campbell 1987, Vermeer and Butler 1989, Morgan et al. 1991, Vermeer et al. 1992, Butler and Vermeer 1994, Bélanger and Lehoux 1994, 1995, Erskine 1997, Vermeer and Morgan 1997). Shorebird distribution and habitat use data also reached publication then (Morrison and Ross 1989, Maisonneuve et al. 1990, Morrison et al. 1994). CWS was involved, mainly in support roles but occasionally as lead agency, in most of the breeding bird atlases that proliferated across Canada after 1980 (Cadman et al. 1987, Erskine 1992, Semenchuk 1992, Gauthier and Aubry 1996, Smith 1996).

Ongoing studies of toxic chemicals effects continued to produce results. Years of experimental field work were needed to demonstrate conclusively that one chemical was harmful even when used at sub-lethal levels (e.g., Busby et al. (1989) re fenitrothion, used operationally in spruce budworm spraying since 1968). Tracking potential sources of contamination found in long-range migrants also took time, e.g., for raptors (Baril et al. 1990, Fyfe et al. 1990, Noble and Elliott 1990), as did tracking the effectiveness of cleaning-up Great Lakes pollution on waterbird numbers and reproduction (e.g., Weseloh et al. 1989, Fox 1993, Ewins et al. 1994). Wide-ranging summaries of toxic chemical contamination in birds were published in this period (e.g., for seabirds, Elliott et al. 1989, Pearce et al. 1989;

for Great Lakes waterbirds, Bishop et al. 1992; for game birds, Braune et al. 1991; lead poisoning, Scheuhammer and Norris, 1995; acid rain and related effects, DesGranges 1989, Blancher et al. 1992, Kerekes and Pollard 1994). Improved monitoring methods were also explored (e.g., Mineau et al. 1990).

Ongoing research or surveys on scarce or vulnerable species produced significant publications on Trumpeter Swans (*Cygnus buccinator*; e.g., McKelvey and Verbeek 1988), Black and Surf scoters (*Melanitta nigra* and *M. perspicillata*; Savard and Lamothe 1991), Loggerhead Shrikes (*Lanius ludovicianus*; Robert and Laporte 1991, Telfer 1992), Ancient Murrelets (*Synthliboramphus antiquus*; Gaston 1992), Whooping Cranes (e.g., Kuyt 1992, 1996), Piping Plovers (*Charadrius melodus*; Flemming 1994), Double-crested Cormorants (Nettleship and Duffy 1995), King and Common eiders (*Somateria spectabilis* and *S. mollissima*; Dickson 1997).

Perceived declines in landbird populations (Robbins et al. 1989, Terborgh 1989) led to a cooperative venture in the U.S., “Partners in Flight,” to examine thoroughly the situation there and recommend remedial actions. Efforts to establish a Canadian counterpart resulted in the “Canadian Landbird Conservation Program” (CLCP), involving CWS with various other groups. This program strayed into a morass of discussion groups and planning documents, apparently because participating groups—including CWS—lacked the research resources needed for greatly expanded studies and wide-ranging monitoring as identified in its framework document.

New research approaches were developed in various fields. Examples included dealing with habitat destruction owing to excessive use by Snow Geese (Kerbes et al. 1990), managing hunted murre populations (Gaston and Elliot 1991), modeling energy demands of seabird populations (Diamond et al. 1993), and use of stable isotopes for linking populations and the areas they used (e.g., Hobson 1994 et al., Alexander et al. 1996). CWS in the 1990s was actively engaged in bird research, especially in subject areas having applications in management or conservation, but such research was increasingly concentrated in a few locations rather than scattered in all field offices as in the past. The Prairie Migratory Bird Research Centre in Saskatoon, Saskatchewan, formally designated in 1967, differed little (except in size) from CWS offices serving other provinces until the 1980s. The National Wildlife Research Centre in Hull, Québec, emerged in the early 1970s when laboratory studies on toxic chemical effects began, but other bird researchers were not stationed there until 1980. CWS seabird scientists mostly found accomodation at government marine biology or oceanography research stations in Dartmouth, Nova Scotia, and Sidney, British Columbia, from the 1970s. The trend toward major research establishments thus paralleled that seen in the U.S. Fish and Wildlife Service 20 years earlier, but CWS regions also persisted in seeking improved research capability. That push led eventually to CWS co-sponsorship of university research centers—roughly equivalent to Cooperative Wildlife Research Units (at U.S. state universities since the 1930s). The Wildlife Ecology Research Chair at Simon Fraser University in Burnaby, British Columbia, and the Atlantic Cooperative Wildlife Ecology Research Network, with scientists at University of New Brunswick, Acadia University, and Memorial University of Newfoundland, took shape in 1993 and 1994, respectively. Much bird work at those centers arises from CWS initiatives, or will have application in CWS, but these establishments do not include CWS personnel (unlike the U.S. situation), and their own niches remain independent.

Much information requested from CWS by the government hierarchy does not (yet) exist, or is based only on general impressions. The complexity of nature, whether birds, bees, bass, or bacteria, seldom lends itself to instant, simple answers. Modern technology has not replaced observations of birds in the field by informed ornithologists. CWS assembled and published large amounts of information over the past 80 years, but the need for general familiarity with birds has never been greater. Keeping most professionals in the office where demands from "higher-ups" can reach them is likely to be counter-productive in the long run.

CONCLUSION

Summarizing what CWS achieved in 80 years, since the Migratory Birds Convention Act became law in 1917, cannot be done succinctly. The preceding pages provide only a selective summary of the varied activities in which CWS was, and continues to be, involved. Other agencies and individuals were assembling information on Canadian birds concurrently, and many also were involved in developing and implementing cooperative actions for bird conservation. CWS cannot claim credit for the current expanded knowledge and improved conservation of birds, but in many times and places CWS was indeed the only agency concerned with birds.

As a management agency, its investigative focus was primarily on distribution, populations, and ecology, with study of other disciplines mainly in supporting roles. For most of its existence, CWS was filling gaps in needed knowledge of birds, and relatively small proportions of staff time could be devoted to syntheses of data, which became progressively more essential after 1970. Even now, most population modelling, except of colonial water- and sea-birds, necessarily involves extrapolations lacking statistical rigor, owing to their sub-continental scale.

The knowledge accumulated, by and through the work of CWS, permits tentative answers to many questions dismissed as unanswerable 30 years ago. In contrast to academic scientists, government ornithologists must often generate replies to political or bureaucratic requests, even when precision and rigor are impossible. A useful level of perspective exists within CWS regarding the status of most Canadian birds, as we enter the 21st Century, but much of that knowledge is spread thinly among a relatively small number of (mostly) older scientists, many close to retirement—or already retired. Current practices seem unlikely to provide those replacing them with opportunities to accumulate comparable experience. CWS in 1997 recognized completion of its first 50 years of work in bird conservation and many other wildlife activities, since the Wildlife Service name became established in Canada in November 1947.

Compared to the situation in 1916, as far as that can be reconstructed, the bird conservation situation in Canada now is a success story, and an important part of that derives from work of the Canadian Wildlife Service. Many species whose numbers had been greatly reduced by unregulated exploitation before 1916 have recovered very well even though sport and subsistence hunting still are practiced widely. Bird-watching and bird-feeding attract people on a scale that would have been inconceivable to our grandparents. Conservation processes are slow, and new problems influencing bird numbers emerge for which the old regulatory measures may not be appropriate. The continuing concern of informed citizens, and their insistence on controls to allow time to work out solutions to bird problems, are needed to convince governments of the lasting need for a Canadian Wildlife Service that is mainly investigative rather than primarily bureaucratic.

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8

History of the Association of Field Ornithologists (Northeastern Bird-Banding Association)

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ABSTRACT.—The New England Bird Banding Association (later Northeastern Bird Banding Association) was formed in 1922. This was a response to a growing need for regional organizations stemming from the federalization of bird banding in North America and a rapidly growing interest in bird banding. During its formative years the organization was run by established Massachusetts ornithologists, including Edward H. Forbush, Charles Wendell Townsend, Alfred O. Gross, Francis H. Allen, John C. Phillips, and Arthur Cleveland Bent. Against strong opposition the Association began publication of a journal (*Bulletin of the Northeastern Bird-Banding Association*) in 1925. In 1930 it became the national journal *Bird-Banding*. The financial survival of the Association and its journal in these early years was largely the result of patronage of a few prominent members. The *Recent Literature* section of *Bird-Banding* became an internationally recognized feature of an increasingly prominent ornithological journal under the leadership of Margaret Morse Nice. Through the 1970s the organization retained a parochial northeastern identity while *Bird-Banding* matured into a journal of international significance. The constant financial problems associated with increasing journal production costs were balanced by revenues from mist net sales under the direction of E. Alexander Bergstrom and Brian Harrington. During the 1980s the organization metamorphosed into a national organization with the journal renamed *Journal of Field Ornithology*, the organization becoming the Association of Field Ornithologists and accepted as a member of the Ornithological Societies of North America (OSNA). During the 1990s increased membership and an inheritance from Charles Blake have produced a strong financial base for the organization. A focus on Latin America, together with a journal that emphasizes field ornithology, have produced a niche for the organization as it prepares to enter the 21st century.

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THE EARLY YEARS

The need for an association arises.—The desirability and practice of individually marking birds date back at least to Roman times, and the practice of placing metal bands on birds's legs to the eighteenth century (Lincoln 1921, 1933). Aluminum bands were first used in Europe in 1899 by a Danish schoolmaster, Hans Chr. C. Mortensen, who according to Lincoln (1933) "may well be called the father of scientific bird banding." By the beginning of the twentieth century it was becoming increasingly clear that the study of bird migration, site fidelity, and a host of other natural history and ecological phenomena would require populations of individually-marked birds.

In North America individual marking of birds dates back to Audubon's famous 1803 "banding" of Eastern Phoebes (*Sayornis phoebe*) with silver wire, but important scientific use of banding began with Paul Bartsch who banded Black-crowned Night-Herons (*Nycticorax nycticorax*) in 1902-03 (Cole 1909). The first organized bird-banding in North America was sponsored by the New Haven Bird Club in Connecticut in 1907 (Cole 1922). Sporadic banding continued until 1909 when the American Bird Banding Association (ABBA) was established at the American Ornithologists' Union (AOU) meeting; Leon J. Cole was elected president (Cleaves 1913, Cole 1909, 1910; Lincoln 1933). The Linnaean Society of New York took over responsibility for the ABBA in 1911, and the association chugged along, struggling with unavailability of mass-produced aluminum bands, inadequate funds, and the disruptions attendant to World War I.

On 16 August 1916, the governments of Great Britain (acting for Canada) and the United States concluded the "Convention for the Protection of Migratory Birds." This was the first of five treaties aimed at the conservation of "migratory birds" (a bird does not have to migrate to be a "migratory bird" in the legal sense) to which the United States is currently a party. The Migratory Bird Treaty gave the federal governments responsibility for the conservation of "migratory birds" and the authority to regulate activities that could be deleterious to their conservation. One such authority provides for regulation of "taking" of migratory birds. The capture of birds, even for banding purposes, falls within the definition of "taking" (E. B. Baysinger pers. comm.).

In 1919, the successes of banding studies, particularly with waterfowl, led Edward W. Nelson, a student of avian migration and Chief of the Biological Survey, to offer to take over banding-related responsibilities from the Linnaean Society. The offer to coordinate bird banding and attendant record-keeping nationally was accepted, and in 1920 Frederick C.

Lincoln took charge of the Biological Survey's new project. The provisions of the Migratory Bird Treaty Act made federal and state licensing of banders possible, and the coordination of the activities of local banders and banding stations, particularly along major migration flyways, created the need for formal regional associations. This need precipitated the formation of the New England Bird Banding Association (NEBBA) (later Northeastern Bird Banding Association) which was to claim bander service responsibility for the New England states, Quebec, and the Maritime Provinces of Canada.

NEBBA is formed.—On 17 January 1922, a meeting was held at the Boston Society of Natural History with Glover M. Allen of the Museum of Comparative Zoology at Harvard University and president of the Nuttall Ornithological Club (NOC), presiding. Major E. A. Golden representing the Biological Survey, S. Prentiss Baldwin from Cleveland, Ohio, and Edward Howe Forbush, State Ornithologist of Massachusetts, all made presentations. The minutes of the meeting report, "The business of forming a bird banding association then proceeded." The groundwork had been done prior to the meeting as evidenced by the presentation of a report of a By-Laws Committee and a vote to accept the By-laws "as read and corrected." The chairman of the Committee on Officers presented a list of candidates who were then elected. The New England Bird Banding Association was then in existence with a set of By-Laws, annual dues of $1, and an impressive slate of New England ornithologists as officers: Edward H. Forbush, president; Charles W. Townsend, vice-president; James Mackaye, 2nd vice-president; Lawrence B. Fletcher, secretary and treasurer; Alice B. Harrington, recording secretary; and as councillors: John E. Thayer, John C. Phillips, William P. Wharton, Aaron C. Bagg, Arthur C. Bent, and Charles L. Whittle. Three councillors were to be elected each year for two-year terms, and the Annual Meeting was scheduled for January of each year.

The first Council meeting followed, on 26 January 1922, at the Hotel Vendome in Boston. It was voted to deposit the funds of the organization in the Commonwealth Trust Company of Boston. The major agenda item was a discussion of whether or not the Association should publish a journal. The discussion was extensive (the minutes occupy seven single-spaced type-written pages) and resulted in the formation of a committee consisting of President Forbush, Vice-President Townsend, Secretary Fletcher, Councillor Whittle, and Charles F. Batchelder to consider the matter. The latter was a founding member and former president of the AOU, and a founder and for 50 years treasurer of the Nuttall Ornithological Club. Several people commented on the difficulty of getting papers published, and the protracted turn-around-time for notes published by *The Auk*.

Several options were discussed. Charles Phillips and Edward Forbush favored some arrangement with the AOU whereby money would be contributed by NEBBA to the AOU so that the size of *The Auk* could be increased or a supplement issued. The possibility of joining forces with the Nuttall Ornithological Club to revise the NOC *Bulletin* or produce a new journal was explored, as was the possibility of making an arrangement with the Boston Society of Natural History. A number of influential ornithologists had been queried about the desirability of NEBBA producing a journal, and Mr. Oberholser (probably Harry Oberholser of the U.S. National Museum) suggested that, since the *Wilson Bulletin* was "on its last legs," money could be raised and it could become the organ of NEBBA. The discussion meandered into the realm of membership and the recommendation of the Biological Survey that other regional bird-banding organizations be formed. Questions of costs and what kinds of papers would be published in a journal were considered. In the end it was agreed that the committee should investigate a broad spectrum of possibilities, and Forbush concluded, "This committee can report on any plan on earth."

The Committee, with 2nd Vice-President Mackaye replacing Secretary Fletcher, reported to Council on 27 February 1922. The Committee unanimously agreed that NEBBA required an outlet for the publication of bird-banding notes and scientific papers, but, not wishing to publish a journal that would rival *The Auk*, recommended that an arrangement should be sought with the AOU so that NEBBA material could be published in *The Auk*. Pursuant to this arrangement, an endowment of $25,000 should be raised to cover the expected publication costs. While these plans were unfolding, the Committee recommended that any available funds be placed in the hands of a Board of Trustees, selected by the Council or membership, for investment. Discussions with Witmer Stone, editor of *The Auk*, had already begun, and in the interim, before any agreement could be reached, it was agreed that NEBBA papers and notes could be published in *The Auk* at cost.

The Council meeting of 13 November 1922 concentrated on the emergence of bird-banding associations in North America. The formation of the Inland Bird Banding Association (IBBA) was announced, and overlap in membership with NEBBA discussed. Letters to NEBBA enquiring about membership from people in the IBBA area were to be referred to that new organization. The question of extending NEBBA to include the Atlantic Slope was discussed at length, and in general sentiment was in favor of extension. The recommendation that a $25,000 endowment be established for the publication of bird banding papers in *The Auk* produced the sentiment that help in raising these funds be shared by other bird banding groups including newly formed IBBA. There was considerable enthusiasm for NEBBA commencing serious scientific work, including the study of bird migration in the Connecticut Valley and intensive study of individual species and terns along the East Coast. A letter was sent to Witmer Stone requesting him to publish "some interesting notes from the New England Bird Banding Association" in the January issue of *The Auk*.

Another Council meeting was held on 18 November 1922 at the State House in Boston. It was voted to request Councillor Whittle, Alfred O. Gross, a Professor of Biology at Bowdoin College, Bowdoin, Maine, and Prentiss Baldwin of Cleveland, Ohio, and president of IBBA, to deliver talks at the Annual Meeting. The final Council meeting in December 1922, dealt with finances, producing a suggested change in the date when annual dues would be assessed from July to January, and establishment of a new category of membership—Sustaining Member at $5 per year. It had been a very busy and productive year for the fledgling New England Bird Banding Association as the reports at the Annual Meeting were to show.

The first Annual Meeting of NEBBA was held on 17 January 1923 in the lecture hall of the Boston Society of Natural History, presided over by President Forbush. The business of the association was conducted with the election of officers and the affirmation of the Council decision to shift the date of dues collection to January 1. There was substantial change in the officer ranks with Charles W. Townsend becoming president; Winsor Tyler, 1st vice-president; and Alfred O. Gross, 2nd vice-president. The corresponding secretary reported on the roughly 2500 letters that had been sent, many concerning state and federal permits for members, and a campaign involving mailing out 15,000 to 20,000 "letters and articles of various kinds relating to bird banding." This included a mailing to the entire AOU membership and other bird clubs and organizations throughout North America. The treasurer's report showed a postage expenditure of $463. The secretary received records from bird banders, with files kept in the office of the Massachusetts State Ornithologist at the State House. Several banders had banded more than 300 birds and as demand exceeded inventory, the supply of bands had run out. The treasurer's report showed receipts of $1094, expenditures of $1027, and bills payable of $67.24. The organization had survived an extraordinarily busy year financially but was facing a deficit. A general address was given by Frederick Lincoln, followed by Alfred O. Gross who discussed banding Common Nighthawks (*Chordeiles minor*), H. W. Herrick on experiences at his bird-feeders, and motion pictures by Herbert K. Job. A note of humor was injected into the proceedings when a list of the 33 attendees was recorded on a specially prepared "banding" schedule, with each person (listed in a column "Homo sapiens") receiving a band number. Under the column "Return," 19 of the 33 had entries dated 16 January 1924, the date of the 1924 Annual Meeting.

Consolidation.—A series of Council meetings in 1923 dealt with the organization of several NEBBA-sponsored programs including a Field Day in Cohasset, Massachusetts, at which banding stations would be visited, a dinner at the AOU meeting in Boston, and a ten-lecture series on ornithology by Glover Allen which included a "correspondence course" consisting of excerpts from the lecture transcripts and synopses. In 1923 NEBBA sent delegates to the AOU meeting and to a meeting under the auspices of the Linnaean Society of New York at which the Eastern Bird Banding Association (EBBA) was formed. Arthur A. Allen, of Cornell University, was elected the first president of EBBA, and suggested, in a letter, the formation of a central bird banding organization with perhaps five subdivisions on the Atlantic seaboard. At the 10 September 1923 Council meeting this suggestion was discussed. President Townsend argued that the present system of regional organizations was better and received unanimous Council support for this rather separatist position. This regional identity of NEBBA remained central to the organization throughout much of its history. The Council meeting of 4 January 1924 focused on changing the name of the Association, necessitated by the inclusion of Quebec and the Maritime Provinces of Canada in the Association's domain. The name "North Atlantic Bird Banding Association" was proposed and defended by President Townsend and others, but the name "Northeastern Bird Banding Association," proposed by Arthur Cleveland Bent, was adopted, largely on the argument that it more logically complemented with the new Eastern Bird Banding Association. The proposed name reported in the minutes did not include the hyphen between "Bird" and "Banding" as became standard usage.

The Minutes of the 17 January 1924 Annual Meeting reflect the various accomplishments of 1923, and the name change to Northeastern Bird Banding Association was formally approved by the membership. Alfred O. Gross became president, Charles L. Whittle 1st vice-president, and Henry S. Shaw 2nd vice-president. Papers presented at the meeting included one by Alfred O. Gross on banding Black-crowned Night-Herons, at Barnstable, Massachusetts, illustrated with "lantern slides," and a paper by Harry Oberholser on the benefits of bird banding. The treasurer's report showed a balance on hand of $339. The organization now had a name it was to retain for more than half a century, a positive bank balance, solid relationships with the other regional bird-banding associations and the AOU, an educational program, and evident stability. The focus of the Association was now turned to the publication of a journal.

NEBBA gets a journal and the organization stabilizes.—At the 16 January 1925 Annual Meeting, President Gross was elected for a second term, and the By-laws were changed to provide an increase in dues to $2 per year. After the morning business meeting and four presented papers, an informal meeting was held where bird traps and other bird-banding paraphernalia were displayed. At the end of 1924 the treasury contained $30—not much for an association which was about to publish a journal for the first time.

The focus of the 22 December 1924 Council meeting, with Vice-President Whittle presiding, was on the question of publishing a journal. Despite objections to the prospect of raising dues and fund-raising, four motions were passed: (1) to increase dues to $2 per year, (2) to accept Lawrence Fletcher's offer to finance the first issue of the bulletin up to $75, (3) "To proceed at once to the publication of the first bulletin," and (4) to elect Charles L. Whittle the first editor, with Francis H. Allen and Winsor M. Tyler associate editors. There is no indication in the Council minutes why the idea of using *The Auk* or some other extant outlet as an outlet for publishing bird-banding papers had been abandoned. Volume 1, Number 1 of the *Bulletin of the Northeastern Bird-Banding Association* (*Bulletin*) was published in January 1925, and the full complement of four issues (73 pages of text) was published that year. In a Foreword in the first number, the purposes of the journal are succinctly stated: "These objects are to furnish a medium wherein our members can publish matters of interest to bird-banders and of value to ornithology, and by means of which the Council can keep in touch with the needs of individual banders." There were several general articles published and a section of "General Notes." In addition a membership list was published with 219 listed from Massachusetts, 79 from other New England states, 43 from other states, and 11 from Canada. Advertisements offered bird seed, traps, bird books, bird nest boxes, and binoculars. In No. 3 Recording Secretary Harrington reported that in 1924 the membership banded 12,463 birds of 69 species and subspecies, with 763 returns (of which 119 were Purple Finches, *Carpodacus purpureus*).

Most of the discussion of the 17 December 1925 Council meeting related to suggested By-laws changes and a response to a letter from IBBA suggesting that Samuel P. Baldwin, first President of IBBA, be made "Dean of Bird Banding." The Council suggested that instead, Baldwin be made "Honorary President" of each of the bird-banding associations. Votes at the 15 January 1926 Annual Meeting initiated By-laws changes which, among other things, increased the number of councillors to nine, three elected by the membership each year at the Annual Meeting, with the Council electing the officers of the Association. The changes also provided flexibility in the number of vice-presidents elected, apparently to allow for sharing the work load of the organization among more people. The initials of the

Association were formally voted to N.E.B.B.A. The report of the recording secretary indicated that, up to the end of 1925, banders of the Association had banded 38,400 birds and recorded 1309 returns. The treasurer's report indicated a $420 deficit at the end of 1925. At the 21 January 1926 Council meeting, Francis H. Allen was elected president and Francis Beach White, 1st vice-president. The question was raised of merging the publications of all of the bird-banding associations, but no decision was made.

At the next Council meeting, 11 June 1926, it was voted to send letters to the other bird-banding associations requesting that they send two delegates to the forthcoming AOU meeting in Ottawa, Canada, for a discussion of the advisability of consolidating the publications of the four associations into a single organ. At a subsequent Council meeting, the president was instructed to appoint two delegates to this meeting, and Recording Secretary Harrington and Harrison F. Lewis were appointed.

The meeting, presided over by Maunsell Crosby, an amateur New York ornithologist, was something of a disaster for the idea of a centralized journal. Several delegates argued that *Wilson Bulletin* would be a good place to publish bird-banding papers, and several argued against the idea of segregating bird-banding papers into a special journal on philosophical grounds. Others pleaded poverty. Harrington reported back to Council that Witmer Stone, editor of *The Auk*, "Spoke in rather an ambiguous manner," and Frederick Lincoln thought that segregating bird-banding material was not a good idea. After an hour and a half discussion, a motion to recommend that the four associations appoint committees to confer on the desirability of publishing a single journal failed six votes to four. EBBA delegates supported the idea, but expressed reservations on financial grounds. J. T. Nichols, who had vigorously supported the idea of a centralized journal, sent a check for $150 to help with publication costs of the NEBBA *Bulletin*. The Council voted to send a letter to the membership explaining the financial plight precipitated by the *Bulletin* and soliciting donations of $2 or more each. The Council also voted to follow up on the good will of the EBBA representatives and try to arrange a meeting with them to explore merging the bulletins of the two organizations. The minutes of the 23 November Council meeting are discouraging, with reports that Frederick Lincoln opposed consolidation, and further that Lincoln, Harry Oberholser, and Samuel Baldwin all opposed segregating bird banding from general ornithological publications, and suggested that the *Bulletin* should be opened up to more general subjects. All concerned were laudatory of the *Bulletin*, and wished its publication to continue—rather ambiguous messages. It was reported that *The Auk* had a two-year backlog of papers, and that the Western Bird Banding Association was "tied up" with *The Condor*, the publication of the west coast-based Cooper Ornithological Society. It was announced that the *Bulletin* would be published in 1927 and that "the same four gentlemen who paid for it last year will pay for it in the coming year." Clearly, it was the determination and financing of a few individuals that kept the *Bulletin* afloat during these difficult times. Perhaps heeding the comments by Baldwin, Lincoln, and Oberholser, an announcement in the April, 1927, issue of the *Bulletin* stated that "many sources" have asked the editors to open the pages of the journal to papers of wider interest than were currently being published, and said that they would consider any papers that "seem likely to interest bird-banders even though not based on actual banding experiences." This broadening portended a name change for the journal, nearly a half century later, to the *Journal of Field Ornithology*.

Routine business and the end of the "paper trail".—In 1926 the Council busied itself preparing a resolution supporting the reappointment of A. L. Bazeley and William Adams to the Massachusetts Department of Conservation, and the business of arranging the 1927 Annual Meeting. The meeting was highlighted by the addresses of Edward Forbush and Thornton W. Burgess, and after the dinner, attended by about 150 members, a series of speeches concluded with Charles Crawford Gorst, "the most accomplished bird whistler in the country," giving imitations of bird calls and songs. The Annual Meetings had become well-attended, with cosmopolitan programs that reflected the burgeoning interest in bird banding. Cash on hand in the treasury, however, was $36.

The 1928 Annual Meeting was held jointly with the Federation of New England Bird Clubs, and was a substantial affair held at the University Club in Boston. There were addresses by Harrison F. Lewis of Ontario, John B. May, and Oliver Austin, Jr., who showed motion pictures of arctic banding adventures. The after-dinner program featured T. Gilbert Pearson, President of the National Association of Audubon Societies (now National Audubon Society), and Ludlow Griscom, newly arrived from New York and the American Museum of Natural History to become a research curator at the Museum of Comparative Zoology at Harvard. Cash on hand was $199, but a "friend of the Association" contributed $100 to defray the expenses of the meeting, and Winsor Tyler donated $150 to publish the October issue of the *Bulletin*. At the 31 January 1928 Council meeting, Francis Beach White was elected president of NEBBA, and the possibility of establishing a category of "Life Member" was discussed and remanded to committee.

At this point the history of the Northeastern Bird Banding Association fades to obscurity with a nearly three-decade hiatus in its minutes of Council and Annual Meetings. Only the scattered recollections of a few of the individuals who helped make the history and inferences drawn from the journal cast any illumination on the progress of the Association.

THE MIDDLE YEARS

The Great Depression and World War II—the journal matures.—It is remarkable that the Northeastern Bird-Banding Association and its journal survived the consecutive traumas of the Great Depression, with the financial constraints it imposed, and World War II with all its manpower drains and financial and material constraints. An announcement in *Bird-Banding* (4:155) in 1933 stated that NEBBA was discontinuing the card-file system of banding records for its membership and that "This drastic move was made in the interest of economy." Henceforth, banding records would go directly to the Biological Survey. In the same year, a plea from the treasurer of the Association for financial assistance from the membership suggested that it might be necessary to reduce the size of the journal. Threats to the Biological Survey budget in 1934 were outlined by J. N. Darling (1934), along with the need for increased financing, either by Congressional appropriation or by private endowment. Announcements from time to time linked the need for increased funding to keep the journal afloat and the solution of increasing the membership of the Association.

Sometime between January 1928 and January 1930 successful negotiations were conducted, aimed at the production of a single bird-banding journal, national in scope, because the cover of the journal for the first number of 1930 reads: "Old Series Vol. VI" "New Series Vol. I" "Continuation of the Bulletin of the Northeastern Bird-Banding Association." The new journal was called "'BIRD-BANDING'" Journal of Ornithological Investigation," and was published for the Northeastern, Eastern, and Inland Bird-Banding Associations. The *Bulletin of the Northeastern Bird-Banding Association* had begun as a journal devoted nearly exclusively to bird-banding and related studies. In its first year, 1925, 21 major papers and 17 notes were bird-banding related, whereas only three notes dealt with other subject matter. In the four issues of *Bird-Banding* published in 1930 four of 22 major papers dealt with subjects broader than bird banding, although the preponderance of notes still was exclusively bird banding in orientation. A "Recent Literature" section was added with reviews by John B. May, including a review of papers on bird banding in *The Condor*, thus beginning the tradition of reviewing papers as well as books, which continues as a hallmark of the journal to the present day. A section on "Correspondence" was also added. The quality of major papers improved, exemplified by the first in a series of life history papers on Song Sparrows (*Melospiza melodia*) by Margaret M. Nice (1931), the poignant paper on banding the last Heath Hen (*Tympanuchus cupido cupido*) by Alfred O. Gross (1931) that chronicled the demise of this subspecies, and the paper by Niko Tinbergen (1936) on sexual fighting and the origin of territory in birds. International papers, exemplified not only by Tinbergen's paper, but also by Seinosuke Uchida's study of swallows in Japan (1932) and banding practices in Italy by Francesco Chigi (1933), highlighted the breadth of the journal. The international involvement and scope of *Bird-Banding* are underscored by the 1935 list of exchanges, five with journals published in the United States, but 21 with journals published in Europe and Russia. In 1936 a cover design featuring an etching by Frank Benson of a Common Tern (*Sterna hirundo*) was adopted. It became emblematic of the Association and graced the journal covers until 1987.

In 1932, the first review (of five papers) by Margaret Morse Nice published in *Bird-Banding* was a harbinger. By 1934, reviews were being grouped under headings (e.g., "Territory," "Bird Behavior," "Banding Papers"), and the "Literature Review" section of the journal, under the guidance of Nice, was rapidly becoming a dominant feature of *Bird-Banding*. In 1936, Nice was joined by Thomas T. McCabe who, as associate editor, began to provide reviews. Nice was cosmopolitan, and hence reviews were from journals world-wide. Despite the inclusion of reviews by other people, Nice's own review output remained prodigious: more than 70 in 1934, over 125 in 1935, nearly 150 in 1936 and again in 1937, and a high of nearly 200 in 1942. Her reviews were not always just summaries—they were often critical assessments, sometimes incorporating rather blunt admonitions. Quality and quantity were her hallmarks. In 1942 when she resigned as an associate editor, she left a legacy of publishing reviews of ornithological papers of international scope that carved a niche for *Bird-Banding* and its successor *Journal of Field Ornithology*. In 1943 her legacy was continued by Donald S. Farner.

In 1939 Charles L. Whittle resigned as editor of *Bird-Banding* after nearly 15 years of service, and the editorship was assumed by James L. Peters, Curator of Birds at the Museum of Comparative Zoology, Harvard University (Fig. 1). Peters guided the journal through the lean years of World War II. The character of the journal remained largely unchanged, although the war years saw a diminution in the number of papers available for publication, and some reduction in the number of published reviews. A notice in late 1941 hinted that the supply of bands might become problematic because of regulations about the non-defense use of aluminum. It had become the practice to publish announcements from

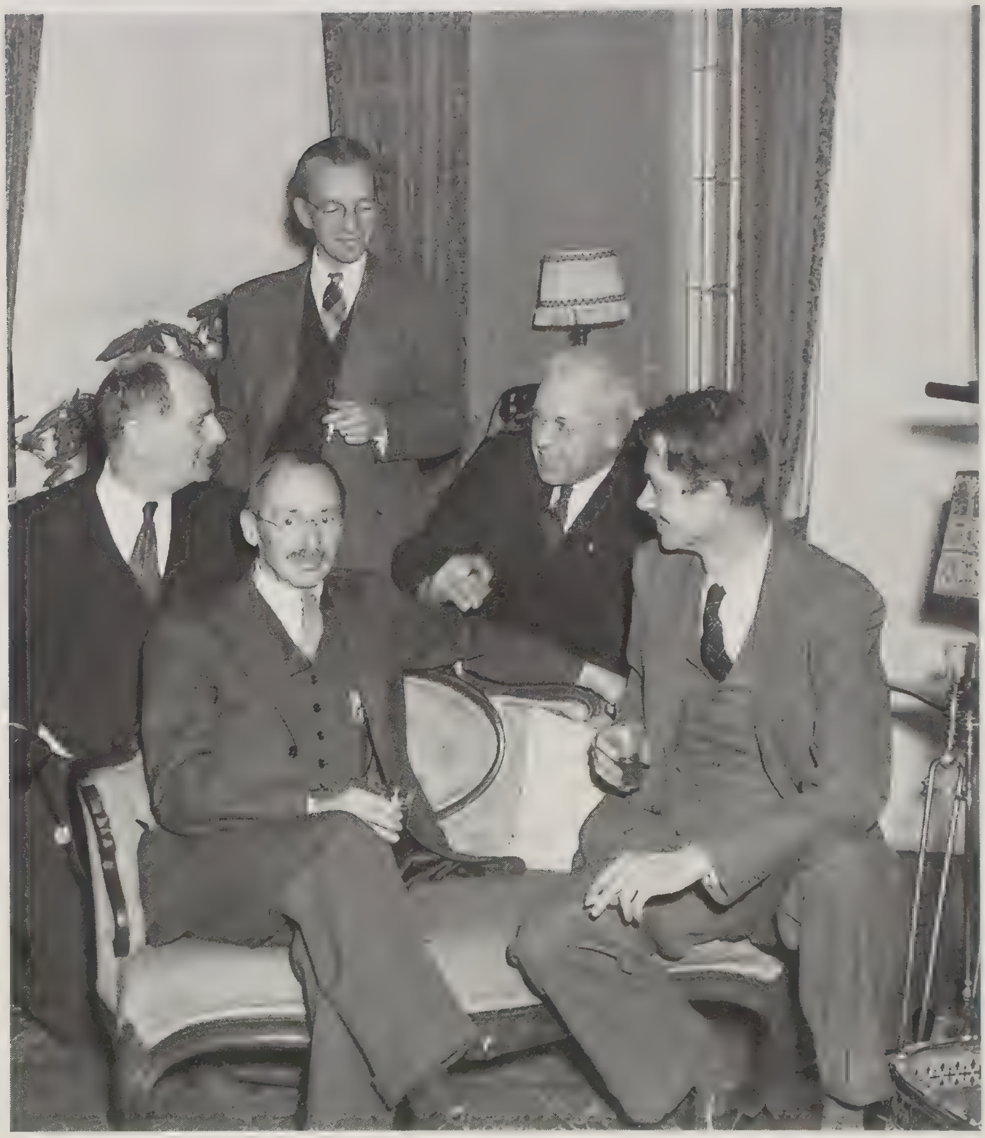

Fig. 1. On couch left to right: James L. Peters, editor of *Bird-Banding*, and Charles H. Blake, president of NEBBA and provider of a major trust fund for AFO; immediately behind Charles Blake is J. Archibald Hagar, vice-president and councillor of NEBBA; also present are Maurice Emery, standing, and Wendell Taber. Courtesy of the Nuttall Ornithological Club.

time to time to facilitate requests for help, to facilitate information exchange among banders, and to advertise events. An announcement stating that the Northeastern Bird-Banding Association was planning to hold a series of out-of-doors meetings during 1942 at various banding stations was followed by an announcement two issues later stating that because of the need to conserve rubber and gasoline for the war effort the planned field excursions had been canceled.

The journal gradually returned to its normal size after the cessation of hostilities. In 1946, an announcement of news about the fate of European ornithologists and journals was published. The number of reviews published returned to, and then exceeded, pre-war levels until the number of pages devoted to reviews exceeded the pages of major papers and notes (e.g., 1950, vol. 21, no. 2: 27 pages devoted to reviews, 17 to papers). In 1950, James L. Peters turned the editorship of *Bird-Banding* over to E. Alexander Bergstrom, who was to pump new life into *Bird-Banding*, implementing a series of changes that made the journal more responsive to the needs of the membership and the ornithological community in general.

The 1950s—winds of change.—The decade of the 1950s saw changes in editorial policy, financial structure, and leaders of the Association. The structure of the Council was altered, the By-laws substantially changed, momentum for incorporation developed, as did the beginnings of a broadening of the spectrum of interests in things ornithological.

Changes in the literature review policies to have fewer but more analytical reviews, with a greater emphasis on papers of interest to banders, were implemented in 1951. In 1952 Oliver L. Austin, Jr. took over the editorship of the "Literature Review" section. A "Notes and News" section, beginning in 1951, provided glimpses into the workings of the Northeastern Bird-Banding Association, and the philosophy of its leaders. In 1951 we learn from "Notes and News" about the "very pleasant field meeting" of the Association at the banding station of Mr. and Mrs. James F. Nields in Hardwick, Massachusetts. An editorial entitled "Whither Bird-Banding" by Charles Blake (1952) suggests new lines of thought and communication among banders (Fig. 1). Paul Bartsch published a short paper on the first bird banding in America (1952). The "Notes and News" announcement outlines the two meetings a year policy of NEBBA: a summer meeting, usually at a private home with a banding station, and a fall annual meeting for which a call for papers was issued.

The philosophical base of the journal was changing. An October 1957 "Notes and News" announcement stated that the greater length of the journal makes possible more rapid publication of papers, and that papers of 40 manuscript pages or more were welcome. Furthermore, although preference was given to manuscripts related to bird banding, "we welcome good papers on many aspects of field ornithology, particularly migration, population dynamics, nidification and reproduction, or plumages or molts."

The annual publication of the treasurer's report began in the early 1950s (Fig. 2). The financial state of the organization was precarious, but apparently stable. The net assets of NEBBA during this period rarely exceeded the cost of printing the journal for a single year. It seems likely that the gradual increase in financial health resulted, at least in part, from increased membership and subscriptions—hints to that effect occasionally surfaced in the "Notes and News." For example in 1957 (28:111) a total of 525 paid memberships or subscriptions was announced compared to 390 in 1951. The international status of the journal was also underscored by the statement that the mailing list included 43 states plus Alaska, seven Canadian Provinces, and 26 other countries.

Another, and increasingly important, factor in the economic health of the Association was the profit from mist-net sales conducted by the organization. The "Notes and News" announcement in the October, 1956, issue of *Bird-Banding* states that Japanese mist nets are for sale and that

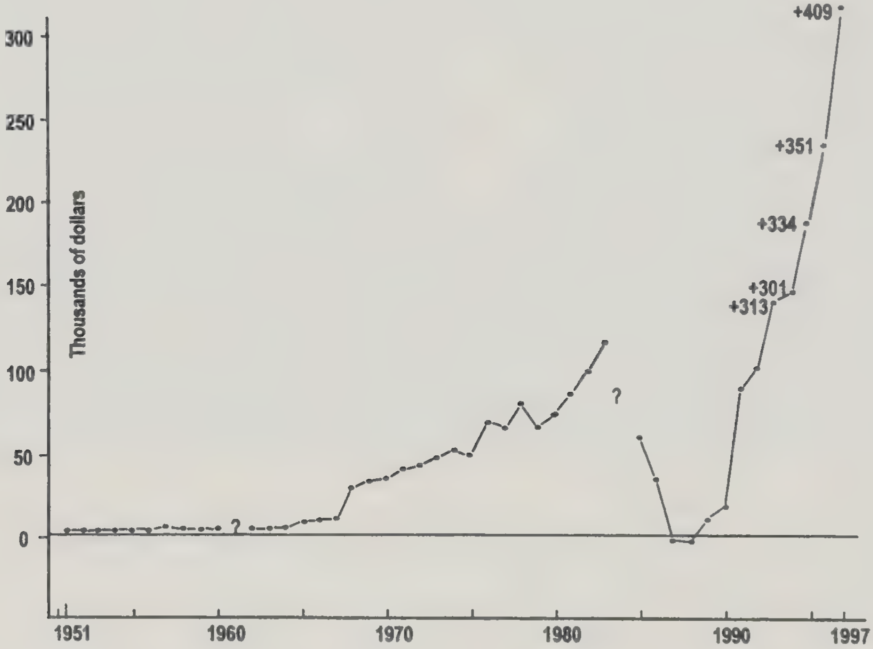

Fig. 2. Financial assets of NEBBA/AFO in thousands of dollars. The numbers preceded by a + represent the value (in thousands of dollars) of the Charles Blake trust for AFO.

inquiries should be made to E. Alexander Bergstrom. Bergstrom was to have a positive influence on NEBBA in many ways, but none more important than in the initiation and management of the mist-net sales for which he was solely responsible (J. O. Seamans, pers. comm.). Although founded to provide difficult-to-obtain nets as a service to ornithologists, the mist-net business was to provide the economic cushion that kept the organization afloat during an era of rising printing costs and other financial constraints. Figures for the mist-net business began to appear in the journal in 1957. Also available in the 1959 report of finances was a cost accounting of the Association's new involvement with the Nantucket Ornithological Research Station, an involvement for which almost nothing appears in the records of NEBBA.

The By-laws were revised in 1954, and among other changes, made past presidents permanent members of the Council. In 1955 definite term lengths were prescribed for vice presidents. In 1959 the position of secretary-treasurer was split into two positions. In 1960 (31:62) the "Notes and News" contained the announcement that a committee of William H. Drury, Jr., David L. Garrison, and Richard J. Eaton (chair), had been established to review the By-laws as part of the preparations for incorporating the Northeastern Bird-Banding Association in the Commonwealth of Massachusetts. The winds of change were gusting strong.

THE LATER YEARS

Incorporation, growth and consolidation.—At the 1 October 1960 annual meeting, the membership voted to incorporate the Northeastern Bird-Banding Association in Massachusetts as a "corporation for scientific and educational purposes" (Anon. 1961). A committee was authorized to arrange for the necessary legal steps to accomplish this end. The reasons given for incorporating were to make it easier for the Association to hold land and securities and to limit the liability of the Association officers. The By-laws, with the legal assistance of Kenneth W. Thomson, were overhauled to make them technically consistent for incorporation and this introduced substantial changes in the governance structure of the Association. Hereafter, there would be a single vice-president, the number of councillors was increased from nine to 12 and the term lengthened from three to four years. The fiscal year was changed from 1 November-31 October, to 1 September-31 August. President Edwin A. Mason led the delegation which signed the appropriate documents on 18 November 1960, and the incorporation was formally completed on 30 November 1960.

The decade following incorporation was largely one of consolidation. It was dominated by E. Alexander Bergstrom who provided financial stability to the Association through careful management of the burgeoning mist-net sales and as editor shepherded the expansion and scope of *Bird-Banding* (Figs. 3, 4). He also represented the Association at the XIV International Ornithological Congress, July 1966, at Oxford, England.

The minutes of the Council meetings reported on the discussions and votes on the usual humdrum business of running an organization. In the Council meeting of 7 October 1961 the discussion of the possibility of joint reorganization arrangements with the Eastern Bird Banding Association resulted in a decision of no action. The Association continued its pattern

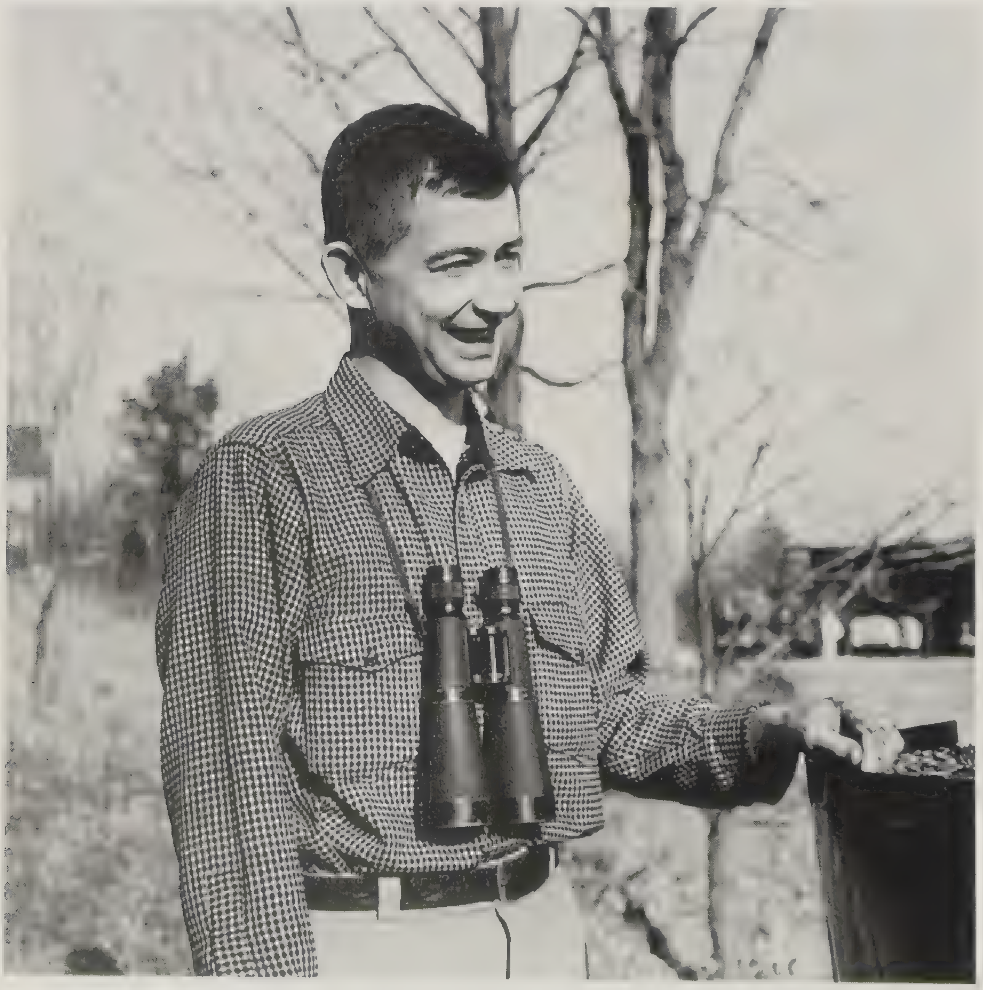

Fig. 3. E. Alexander Bergstrom,. editor of *Bird-Banding*, vice-president of NEBBA, and organizer of the mist-net business, 1953. Courtesy of Peter Bergstrom.

of two meetings per year with a field meeting in the spring and an annual meeting in the fall. The Council met at both of the meetings. As established by tradition, most of the field meetings were held at private homes with banding stations while most of the annual meetings were held at Massachusetts Audubon sanctuaries, particularly at Drumlin Farm in Lincoln, Massachusetts (Figs. 5-7). There was some discussion about the programs for the annual meetings with some preferring a field-oriented meeting with bird banding, and others wishing a more professional program with formal papers presented.

The mist-net business continued to grow despite longshoreman strikes which disrupted shipping, changes of agents in Japan, and problems with

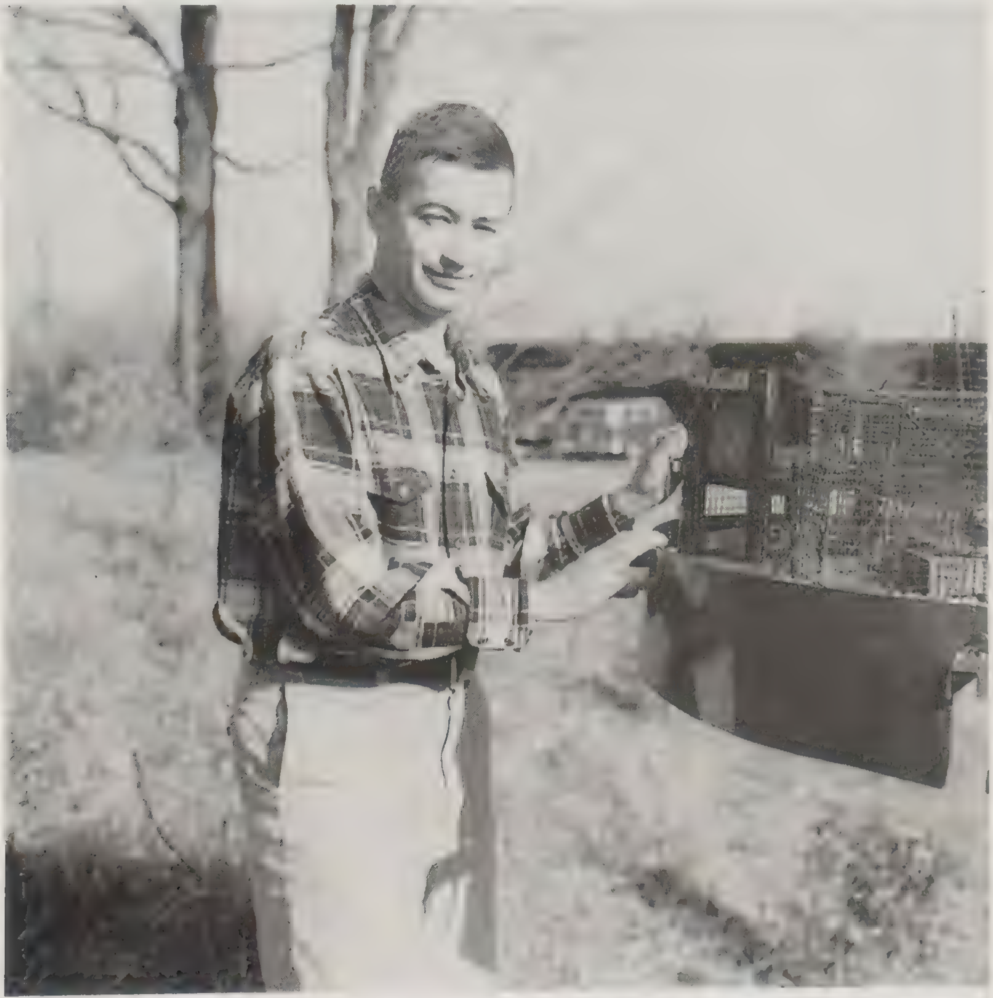

Fig. 4. E. Alexander Bergstrom removing a bird from a trap, 1953. Courtesy of Peter Bergstrom.

Fig. 5. An informal NEBBA gathering, 1953. Courtesy of Peter Bergstrom.

U.S. Customs—all of which required enormous effort from Bergstrom. He was influential in getting a bill passed by the U.S. Congress in 1963 which exempted mist nets from custom duties—he kept a framed copy of the bill on his office wall. The profits were originally designated to cover the costs of the ten-year indices of *Bird-Banding*—with the indices and how long it takes to prepare them a recurrent theme in the minutes of the Council meetings of the 1960s and early 1970s. In 1961 the subscription and membership price was increased to $5 to offset increased journal printing costs, and they were raised again in 1970, to $6 for members and $8 for institutional subscriptions. Council decided that as a matter of policy the Association should not contribute to local organizations and thus resigned from the Massachusetts Conservation Council. The Goetz fund was estab-

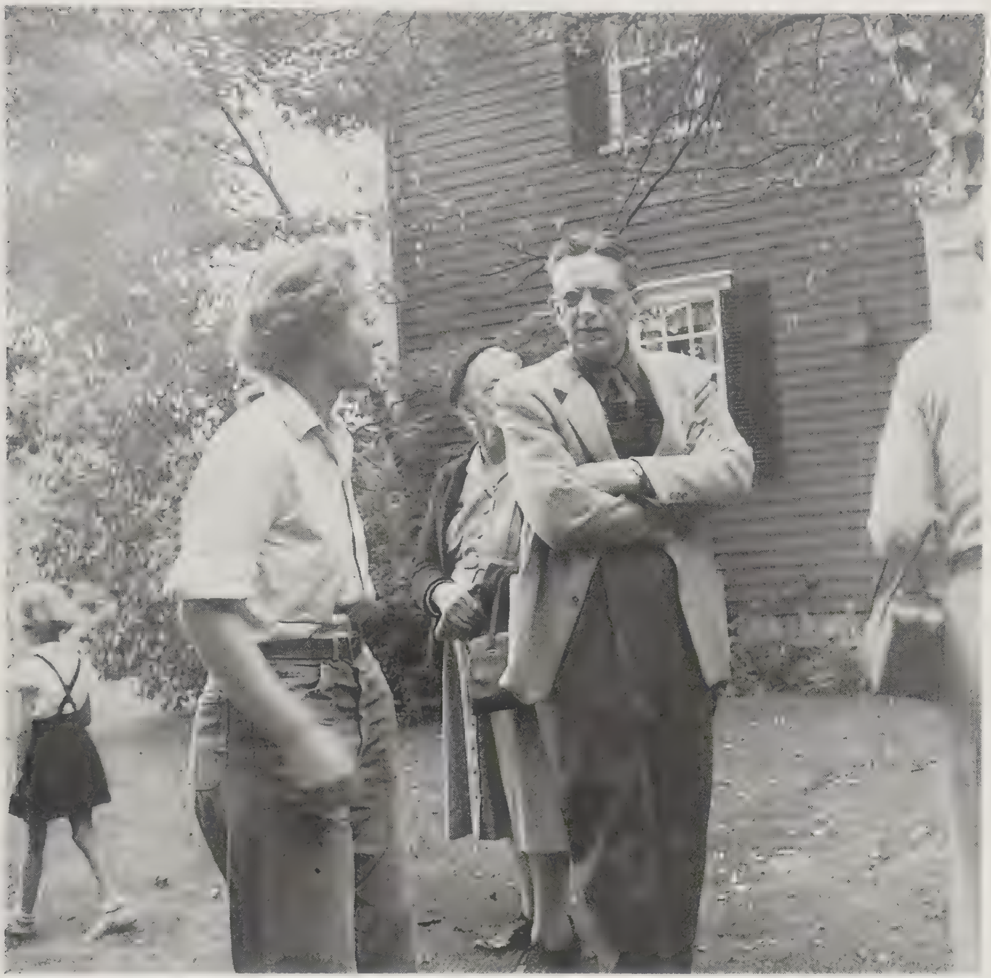

Fig. 6. Mary Shaub and Parker Reed, both vice-presidents of NEBBA, at informal NEBBA gathering, 1953. Courtesy of Peter Bergstrom.

lished with a legacy, subject to life estates, from Christian J. Goetz of Cincinnati, Ohio, in 1964, and in 1969 it was the sense of the Council that the treasurer should invest these funds in short-term Treasury notes rather than leave it in a savings account. By 1970 this had been accomplished with the purchase of $20,000 in short-term Federal National Mortgage Association debentures. A need for more professional management of Association funds was emerging. In 1969 a need to revise the By-laws again had arisen and at the 8 November Council meeting, President James Baird proposed a committee for By-laws review. Lawyer James Hallett agreed to serve on the By-Law Revision Committee. Of particular concern was the shifting of the fiscal year to coincide with the calendar year.

Fig. 7. C. Russell Mason, vice-president of NEBBA, center, at informal gathering of NEBBA, 1953. Courtesy of Peter Bergstrom.

It was during this decade that Manomet Bird Observatory (MBO) (now Manomet Center for Conservation Sciences) was founded and became strongly involved with the Northeastern Bird-Banding Association. The 26 October 1968 Council minutes include the resolve "to offer the formal, general support of NEBBA to the proposed Manomet Bird Observatory," and it was also voted to provide a research grant of $200 for the observatory for that financial year. A grant of $200 in 1969 to help with MBO publications was authorized. An unrestricted grant for the same amount was given in 1970.

Bird-Banding was expanding in size and scope and on 22 May 1965 Council unanimously approved the formation of an advisory board with a representative from each of the bird-banding associations, but with the stipulation that NEBBA would maintain total control and financial responsibility for the journal. It was also decided that obituaries in *Bird-Banding* be restricted to officers of the Association. The membership gradually increased and the 1964 membership list of 576 was published in *Bird-Banding*. By 1970 the archaic requirement of formal election of new members to the Association was circumvented by granting the treasurer the authority to accept new members. In 1964 Oliver Austin, Jr. resigned as Literature Review editor having served the organization in that capacity since 1952. He was replaced by David W. Johnston. Four years later Jack P. Hailman took over these responsibilities.

In 1966 Council voted to merge the subscriber and membership list by electing all individual subscribers to membership, leaving only corporate bodies as "subscribers."

In the mid-1960s, Earl B. Baysinger, then Chief of the U.S. Fish And Wildlife Service's International Bird Banding Laboratory, expressed serious concern to key people in all four banding associations about difficulties in communicating effectively with banders throughout the country. The procedures for handling banding data were evolving from hand or typewritten, manually filed documents, into one using Automatic Data Processing equipment and systems. It became essential that banders be kept current to enable their data to be processed by the new systems. After attending several meetings of all four banding associations, it became apparent to Baysinger that banders were also having difficulty communicating among themselves (e.g., techniques or requirements well known among east coast banders were unfamiliar in the west and vice-versa). Baysinger suggested combining the individual journals into a new, national journal devoted primarily to banding techniques and information from the Banding Laboratory. The banding associations' reactions to the proposal, soon dubbed the "Great Journal Joining" were mixed (E. B. Baysinger, pers. comm.).

In 1969 Council discussed the future of NEBBA and bird banding, and it was the sense of Council that the Association should investigate the possibility of reaching agreement with the other banding organizations to produce a second journal—a less technical publication. This was further discussed in the 5 November 1971 Council meeting when it was voted that the president should appoint a committee of three to investigate with the other bird banding organizations the "Great Journal Joining" in which a "newsy type" journal would be jointly published. Incoming President John H. Kennard promptly appointed himself, James Baird, and E. Alexander Bergstrom to the committee. It was becoming clear that *Bird-Banding* had increased in scope and sophistication to the point where some people believed that it no longer served the day-to-day needs of many bird banders. However, the Council minutes do not report on further progress with the proposal other than "supporting" the idea of a lay journal. In 1976 the Eastern (EBBA) and Western (WEBBA) Bird Banding Associations merged their regional journals to publish *North American Bird Bander*, and were joined by the Inland Bird Banding Association (IBBA) in 1981 (Jackson 1983). NEBBA chose not to join the other three organization in the production of a "newsy" journal devoted to bird banding. From the beginning, however, *North American Bird Bander* has included a blend of technical scientific articles and Association news.

In 1970 Alexander Bergstrom announced his intention to resign as editor of *Bird-Banding*, and President Baird appointed an Editorial Search Committee of Kenneth Parkes, Glen Woolfenden, and Harrison Tordoff to search for a new editor. David W. Johnston was appointed editor in November 1971, and E. Alexander Bergstrom's 21 years of service as editor came to an end. His health was failing, and new leadership was emerging which would guide the Association through the next decade.

The beginnings of the shift to a national organization.—During the next decade the Association would begin the shift from a regional to a national organization. Major personnel changes would occur. Alexander Bergstrom died in 1973 and Elizabeth "Betty" Downs stepped down in 1974 after serving the Association on the Council for 20 years, including 15 years as treasurer. She was eventually rewarded with Honorary Membership. The Association's governance structure modernized and changed, the membership grew substantially, and the paradox and associated problems of a small, regional association with an international-class journal would become apparent.

A burst of energy, enthusiasm, and change occurred in the early 1970s. This was particularly evident in the activities of the new editor, David W. Johnston. In his first issue of *Bird-Banding*, January 1972, he announced the formation of an Editorial Advisory Committee consisting of Jon C. Barlow, Alexander Bergstrom, Alan H. Brush, Nicholas E. Collias, L. Richard Mewaldt, and Bertram G. Murray, Jr. Jack P. Hailman stepped down as Recent Literature editor and was replaced by Bertram G. Murray, Jr. By 1973 Council was investigating the use of page charges to help offset printing costs. In 1975 the journal took on a new look with a square spine binding replacing the stapled saddle-stitch binding. The editorial duties were expanding along with an expanding journal, and in 1974 Council authorized funds for the editor to attend the annual meetings, and $800 for editorial assistance. In 1975, Council voted to provide a $1000 honorarium for the editor. Dr. Leon Kelso was made the first Honorary

Member of NEBBA in 1978 for "his faithful and devoted service to NEBBA as a reviewer of foreign literature for *Bird-Banding*."

The death of E. Alexander Bergstrom on 21 March 1973 ended an era for the Association and necessitated a restructuring of the financial arrangements. Over a 16-year period Bergstrom, often using his personal funds, had built the mist-net business into a major financial structure for support of the organization. The minutes of the 8 June 1973 Council meeting report that an arrangement had been achieved with Manomet Bird Observatory (MBO) to act as agent for NEBBA in the mist-net business. The Mist Net Committee, chaired by James O. Seamans (Fig. 8), would oversee the business, and Brian Harrington from MBO was appointed assistant treasurer for the mist-net account. At the same meeting President Kennard urged the formation of a standing Investment Committee to advise the treasurer on investing the Association's funds. At the May 1974 meeting the committee, consisting of President James O. Seamans, and the secretary and treasurer,

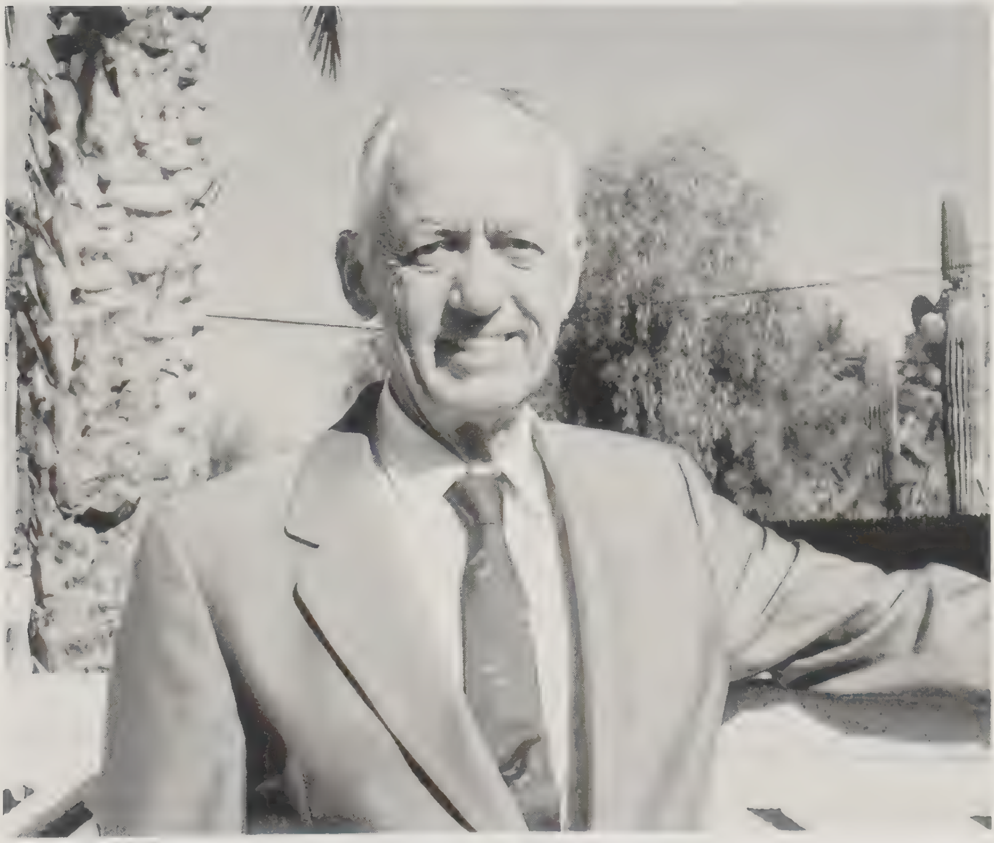

Fig. 8. James O. Seamans, president of NEBBA, 1990. Courtesy of James Seamans.

Fig. 9. Left to right: Jerome A. Jackson, Editor of Journal of Field Ornithology and president of AFO, John C. Kricher, and William E. Davis, Jr., both presidents of AFO, 1998. Courtesy of Jerome Jackson.

advised Council that they had rejected the idea of hiring someone to manage the funds because it was too expensive and hence they had bought some stock and opened a NOW account. In 1976 Council voted that the Investment Committee should consist of the president, treasurer, and secretary, with an option to add one or more NEBBA members. In 1978 James O. Seamans was voted chairman of the Investment Committee. The Bylaws were amended at the 1978 annual meeting to have the fiscal year coincide with the calendar year.

The Internal Revenue Service (IRS) was concerned about unrelated business income in a non-profit organization, and the Association began a long discourse with them. The 1978 change making the fiscal year coincide with the calendar year caused further problems with the IRS which were finally resolved by President Robert Yunick. Another nagging problem raised by Council concerned the storage and distribution of back issues of *Bird-Banding*. This was temporarily solved with the transfer of the stock to Manomet Bird Observatory. In 1979 bookseller Patricia Ledlie in Maine took over responsibilities for storage and disposition of the stock.

The chronic problem of new member recruitment was addressed at the October 1975 Council meeting with President Seamans presiding. Council voted to establish a committee to examine ways for encouraging new membership, and George Clark, Charles Huntington, and Frederick Davis were selected for the committee. The report of that committee at the October, 1976 Council meeting provided the first glimpse into the profound changes that would occur in the Association during the 1980s. Frederick Davis gave the report and mentioned the need to enhance the image and perceived value of the Association if it were to attract new members. This was the first mention in Council minutes of a concern that led to efforts to convert the regional Association into a national one.

At the 1978 September Council meeting the problems of membership were again a topic of considerable discussion, and it was formally voted to establish a Membership Committee which "would look for a broader audience" to gain new members. At that same meeting, Editor Johnston reported that he had changed printers to the more expensive, but in many ways better, Allen Press, and after much discussion, the Council voted to change the name of the journal from *Bird-Banding* to *Journal of Field Ornithology*, a name first suggested by Claudia Wilds (D. W. Johnston, pers. comm.). The cover and format were to remain the same, a subheading "Formerly Bird-Banding" would be included, and the consecutive volume numbers would be retained making the 1980 volume of *Journal of Field Ornithology* volume 51. During its 50 years *Bird-Banding* had become a respected journal, but the shift in focus from bird banding to many areas of field ornithology had made its title obsolete. It was abundantly clear that this name change would in all probability enhance the image and standing of the journal and appeal to a wider audience. Because printing costs were increasing faster than income, the dues were raised in 1979 to $8 for individuals and $10 for institutional subscribers. In 1980 David Johnston stepped down as editor and, with the last issue of 1980, Jerome A. Jackson became editor (Fig. 9). Johnston's leadership had produced profound changes in the journal and were a harbinger of sweeping changes that would occur to the Association during the 1980s.

In 1974 Council discussed the possibility of establishing a fund named in honor of E. Alexander Bergstrom, to provide small research grants. The fund was established and the first grants by the E. Alexander Bergstrom Research Fund were awarded in 1975. In 1976, a gift of $1000 from Elizabeth Bergstrom and a gift of $500 from John S. Dunning substantially added to the endowment for the Bergstrom Fund. In 1977, Council approved $1000 for the committee to award that year.

The scheduling and structure of meetings changed substantially. A joint meeting with the Eastern Bird Banding Association was held in April 1976 at the 4-H Conference Center in Chevy Chase, Maryland. At the October 1976 Council meeting it was voted not to have a spring meeting in 1977. Although a winter or spring Council meeting remains a feature of the organization up to the present day, and the annual meeting is sometimes held in the spring, a Spring Field Meeting for the membership has not been held since 1976.

Despite increases in dues and membership (1175 members in 1981) the issue of using capital funds to pay for the journal surfaced in the April 1980 Council meeting. Assistant Treasurer Brian Harrington warned that overdrawing from profits of the mist-net business would lead to reductions in stock and possible future problems. It was clear that there was concern for the financial stability of an organization that depended heavily on mist-net income to balance its books. These nagging financial concerns would continue to plague the Association through most of the 1980s. In 1981 George Clark became president and the Northeastern Bird-Banding Association stood poised on the brink of major change (Fig. 10).

Beginning a shift to a national organization—In 1981 the Northeastern Bird-Banding Association was in the awkward position of producing a national or international journal with the financial base of a parochial and regional organization. Scott Sutcliffe (pers. comm.) referred to it as "a homespun organization of active banders, professional and backyard." The officers and councillors were mostly from New England and New York state, and the annual meetings were modest affairs with substantially fewer than 100 participants unless the meeting was a joint one with the Eastern Bird Banding Association. The meetings were usually at nature centers and Audubon sanctuaries. The meetings were informal and "Always in attendance was a stalwart group of amateurs who convened for friendly conversation, practical workshops, and advice from the bird banding lab" (S. Sutcliffe, pers. comm.). There was usually a single paper session with workshops being the dominant activity. The parochial nature of the organization is typified by an anecdote from the 1981 annual meeting. The banquet speaker had assumed that dinner would be provided and had not signed up for the banquet. Upon arrival at the banquet hall he was informed that there were no tickets available and he walked across the street to a Friendly's restaurant for dinner and then returned to give the evening presentation.

Fig. 10. George A. Clark, Jr., president of AFO. Courtesy of George Clark.

George Clark reported (pers. comm.) that when he became president, the view was already prevalent that the Northeastern Bird-Banding Association should expand its scope, although there were counter currents that expressed concern that the strong amateur contingent and banders of the organization might lose interest. Certainly renaming the journal to reflect a broader scope had been suggestive. The journal continued to prosper under the editorship of Jerome Jackson, but printing costs were rising faster than dues from increased memberships and investment income. Hence, a deficit situation and the erosion of the Association's meager endowment became a constant specter and occasional reality. In 1981 membership dues contributed about 55 % of the income, investments about 20 % and the sale of mist-nets 25 %. Increase in membership was considered the major way in which to increase income, and membership drives became a virtually constant activity. President Clark's comments, reported in the 29 April 1983 Council minutes, reflect the growing financial concerns: "He outlined problem areas which will need attention at this meeting, including the state of the financial records, the relationship between prospective income and expenditures and the strong possibility that additional income must be sought. . . ." Despite increases in memberships a dues increase from $10 to $14 was considered necessary and was so approved at the 1983 annual meeting. In addition, the membership secretary, Cindy Youngstrom, indicated that she could no longer continue the membership list duties. This precipitated a discussion of whether to transfer the list to Allen Press for computerized services, or whether to attempt to contract the services of the Ornithological Societies of North America (OSNA), which was then located at the Cornell Laboratory of Ornithology. There would be inevitable delays to joining OSNA, so NEBBA membership services were transferred to Allen Press. The By-laws needed revision to make them conform to the new name of the journal and current procedures. Seven changes were voted in the 1983 annual meeting. Clearly, the Association was experiencing growing pains.

The depths and the heights—At the April 1984 annual meeting in Fairfield, Connecticut, John C. Kricher was elected president of the Northeastern Bird-banding Association, and on his recommendation, William E. Davis, Jr. was nominated and elected vice-president (Fig. 9). Their election was followed by an acceleration in the continuing shift from a regional Association to a national one.

John Kricher was a relative newcomer to the organization, having chaired its Membership Committee for a year, and having served on Council for a single year before becoming vice-president in 1983. Until 1983 he had never attended an annual meeting. He held a master banding and salvage permit, but bird banding was a minor concern to him. Davis had not served on the Council and had attended only the 1981 annual meeting prior to his election as vice-president. During the next five years, with Kricher as president for three years and Davis for two, the Association would change its name to The Association of Field Ornithologists, restructure its By-laws, begin the ascent to financial stability, and become a national organization as the fourth member of the Ornithological Societies of North America.

At the April 1984 annual meeting John Kricher was greeted in his new presidency with a treasurer's report indicating that finances were in disorder, an audit was needed, and the cost of publishing the journal was "becoming astronomical" with an increase of about 10% in the past year. The financial situation was to worsen over the next few years. Problems with the treasurer's reports are evident in the Council minutes of 26 April 1985: "Figures were somewhat unclear and the organization's financial status was difficult to ascertain. . . . Discrepancies on the financial statements for 1984 included the fact that dues-on-hand were missing, no deposits-in-transit were listed, and our reserves were not listed. The new Treasurer [Scott Sutcliffe] faces quite a task to put our affairs in order. . . . We have no budget to adopt or discuss today." The January 1986 Council minutes read, "The IRS has written us a letter as of November 1985 indicating that we could be in for fines and criminal penalties as no tax returns have been filed by NEBBA for 1982, 1983, and 1984." The same minutes report "It was MOVED, SECONDED AND VOTED that the Board delete the sentence from the Treasurer's report in the Friday, 6 April 1984 Minutes of the NEBBA Council Meeting . . . 'He reported some difficulty in obtaining information on investment [Fund] moneys.' The Council deleted the statement because they are now convinced that it was untrue." In 1984 and 1985 checks totaling $3000 were returned for insufficient funds. All was not well with the internal financial workings of the Association. Financial woes were exacerbated by declining mist-net sales and the erosion of the dollar compared to the Japanese yen. Competition from a new commercial supplier of mist nets, in 1987 added to financial problems.

Printing costs were skyrocketing and by 1986 the Association was showing a substantial deficit (about $15,000 in 1986) and the books were balanced by spending capital. The one bright spot was the continued success of investments under the able leadership of James O. Seamans, chairman of the Investment Committee. The value of the investments increased by 24% in 1983. In 1985 Seamans was elected an Honorary Life Member of the Association for his accomplishments. Council member Peter Cannell organized a major membership drive, and Council authorized $1000 to this end. By 1985 a standing committee dealing with membership development had been established by Council. But the major hope for reversing these financial trends lay in joining OSNA. Other organizations that had become OSNA members had experienced substantial membership increases. Despite all the other efforts the Council felt compelled to increase dues to $20 for 1986.

President Kricher's 1985 annual report to Council indicated that he had initiated discussions with Sandra Gaunt of OSNA, and he proposed to Council that he be authorized to lay the groundwork for affiliation with OSNA. As part of the strategy to become eligible for affiliation with other national organizations President Kricher stated: "I am wondering if it would not be appropriate for our organization's formal identity to evolve in the same way that our journal's identity has evolved. JFO was formerly BIRD-BANDING. Perhaps it is time to consider the possibility of renaming our organization the *Association of Field Ornithologists*, to indicate our broadened perspectives." At the following Council meeting he appointed a committee to look into the name change, and later placed an editorial in the journal asking for members' comments.

In 1985 President Kricher and Vice-president Davis attended the American Ornithologists' Union meeting in Phoenix and discussed the possibility of joining OSNA with its Director and the presidents of the three OSNA associations. They returned with the opinion that as a regional organization, NEBBA would not be permitted to join OSNA, and that an important first step would be to change the name of the Association to the Association of Field Ornithologists.

At the 19 January 1986 Council meeting, it was arranged for Council to vote by mail on the name change after obtaining legal advice on name-change procedures. The results of this ballot were 19 to 0 in favor of the name change. In his 1986 annual report to Council, President Kricher stated that all 35 replies to his journal editorial concerning the name change had been positive. His comments included the following analysis, "in the long run it makes little sense to move ahead boldly with the journal but remain strictly a regional bird-banding organization in identity. We must take on a more national posture, convince OSNA that we belong with them, and make major strides in enhancing our membership numbers. I am convinced that we can change our identity to AFO, assume a larger posture, and still welcome contributions by amateur ornithologists who have been important contributors throughout the history of the association." On 3 May 1986 the organization became the Association of Field Ornithologists (AFO) by a vote of the members with 45 in favor, zero opposed, and one abstention.

One very unexpected discovery accompanied the name change. Attorney John A. Shetterly, representing the Association in the legal aspects of the name change, found when he was filing the required papers, that the annual reports had not been filed with the Secretary of State for the Commonwealth of Massachusetts for many years, if ever, and that the Association legally no longer existed! The corporation had been dissolved. A flurry of negotiations followed and it was agreed that the retroactive filing of the last ten years of annual reports, duly signed by current officers, would make possible the revival of the Association. On 11 March 1987, Secretary of State for Massachusetts, Michael J. Connally signed the Certificate of Revival with the new name in place, and John A. Shetterly was appointed Resident Agent for the Association.

The positive results of the name change were swift in coming. At the August 1986 AOU meeting at Mississippi State University, Edward H. Burtt, Jr. and Jerome A. Jackson represented AFO at the OSNA Council meeting.

At that meeting approval in principle was given to AFO becoming the fourth member of OSNA. President Kricher designated Scott Sutcliffe, Edward H. Burtt, Jr., and William E. Davis, Jr. as the OSNA Transition Committee. It was announced at the May 1987 annual meeting that AFO would formally join OSNA before the beginning of calendar year 1988. AFO officially became a member of OSNA on 1 September 1987. The welcome from the three other OSNA societies was warm and President Davis received an invitation for AFO to join the other OSNA societies in a joint meeting in Los Angeles in 1990. Mary Clench, President of the Wilson Ornithological Society (WOS) offered the alternative of a joint meeting with WOS in New England in 1990. AFO ultimately chose the latter alternative.

The By-laws of the new AFO were somewhat out of line with the practices of the new organization, and John A. Shetterly agreed to prepare by-laws changes consistent with AFO becoming a member of OSNA. A By-laws Committee was appointed by incoming President Davis in May 1987 with Shetterly as chairman. At the January 1988 Council meeting Shetterly presented By-laws revisions for discussion. The major proposed changes included limiting the tenure of the president and vice-president to two years, and past Presidents, except for the immediate past President, would no longer automatically be members of Council. The long-standing requirement of the membership voting on new membership applications was formally discontinued—anyone willing to pay dues was welcomed automatically to membership. The Vice-President would serve as Program Chairman for annual meetings. These major policy changes were approved by Council after a lengthy discussion. These changes were voted at the May 1988 meeting in Woodstock, Vermont, with 34 affirmative, none opposing and a single abstention. The by-laws now were consistent with the Association's membership in OSNA.

Beginning with volume 57 in 1986, Edward H. Burtt, Jr. became the editor of *Journal of Field Ornithology*. He instituted many changes in the journal, including an emphasis on short papers to ensure rapid turnaround time, publication of Spanish abstracts, titles, and tables of contents. He eliminated notes so that all articles would have Spanish abstracts and titles, and in 1986 deleted "Formerly BIRD-BANDING" from the journal's cover. These changes laid the groundwork for developing ties between the Association and Latin American ornithology that have become a hallmark of the Association in recent years. A new cover format retained the Common Tern design which had symbolized the Association for nearly 50 years. Horizontal lines of different widths near the bottom of the cover symbolized different band sizes and emphasized the bird banding roots of the journal.

The Bergstrom research awards had become an important part of the Association, making small grants available to student, amateur, and professional ornithologists. The total amounts awarded rose from $550 in 1975 to $2500 in 1984 and 1985.

The Association had no formal archives and the papers of the organization were scattered among the various officers. The possibility of a formal archival arrangement was discussed. Vice-President Davis initiated negotiations in 1987 with the Smithsonian Institution Archives to become the official repository for Association documents. By May 1987 the formal proposal had been submitted to the Smithsonian Institution and accepted.

At the January 1987 Council meeting, Kathleen Anderson proposed that AFO join the International Council for Bird Preservation (ICBP) (now American Bird Conservancy of BirdLife International), and Council voted to have President Kricher apply for institutional membership. By 1988 AFO was a voting member of the ICBP. At the same meeting there was a discussion of the possibility of AFO publishing the Winter Bird Population Study (WBPS) and Breeding Bird Census (BBC), formerly published by the National Audubon Society. The consensus was that outside funding would be required. In May 1987, with the strong support of incoming President William E. Davis, Jr., it was voted by Council to publish the censuses if outside funding could be found. In 1988 the U.S. Fish and Wildlife Service agreed to fund publication of the surveys for five years as a supplement to the *Journal of Field Ornithology* under the responsibility of Editor Burtt.

President Davis, in his January, 1988 report to Council, stated that his major concern was the precarious financial situation of the organization. This concern was echoed in the Council meeting by Treasurer Sutcliffe. Deficits totaling more than $65,000 between 1985 and 1987 had severely eroded the working capital, and the added preliminary expenses incurred in joining OSNA threatened a further erosion of capital. Without the proceeds from the mist-net business, the deficit would have been substantially more. The situation was bad enough in 1988 that the Bergstrom research awards were reduced to a paltry $500 total. To increase membership, a new Membership Committee was named, and a new brochure was drafted. President Davis, with Council approval appointed an Investment Committee and a Long Range Planning Committee. Council meeting minutes are replete with discussion of how to achieve financial stability. Brian Harrington, who ran the mist-net business, articulated his and the Council's concern that income from the sale of mist nets was being used to balance the books each year rather than using the income to build endowment. In 1990, the dues were raised to $21 for individual membership.

A need to articulate the goals of the organization emerged from the financial discussions. The consensus that developed from the January 1989

Council meeting was that the Association of Field Ornithologists should encourage investigation of all aspects of field ornithology with an emphasis on the Western Hemisphere, publish a first-rate journal, promote scientific investigations through publications and meeting presentations, enhance communication and cooperation between amateur and professional ornithologists, and promote bird conservation. These lofty goals encompassed the broadened professional perspective consistent with membership in OSNA and the need to establish a niche for the Association in ornithology while maintaining its historically strong ties with the amateur ornithological community.

The annual Report submitted by President Davis at the April 1989 meeting in Pinkham Notch, New Hampshire, highlighted the changes that had occurred in the Association over the preceding five years, and noted that the Association would be electing a new president, vice-president, secretary, and treasurer, and that a new editor for the journal and a new chairman for the Research Committee (which selects the recipients of the Bergstrom awards) would be soon selected. Sarah (Sally) Laughlin had served the Association as secretary since 1976, and Scott Sutcliffe as treasurer had brought order out of chaos in the financial records. The upheavals within the organization during the preceding five years had been substantial and it appeared that it was time for a period of consolidation.

Consolidation and growth—The Pinkham Notch meeting was the last of the local, warm, and parochial meetings of the Association for some time to come. George Jonkel was retiring after 17 years as Chief of the U.S. Bird Banding Laboratory and had become a fixture at the meetings of the Association with his annual report to the membership. A resolution of appreciation was bestowed on George and a special band was placed on him by John Kricher after appropriate "wing chord" measurements were made. The meeting was typical of the small, informal, and friendly gatherings which had characterized the Association for much of its existence. In 1990 the annual meeting was a joint meeting with the Wilson Ornithological Society held in June at Wheaton College in Norton, Massachusetts. With 163 registrants, it reflected the Association's new role as a partner in OSNA. The 1991 meeting was held at Ohio Wesleyan University, Delaware, Ohio, in conjunction with the University's Clark Ornithology Symposium with a total of 260 registrants. The 1993 meeting was yet another joint meeting, this time with the American Birding Association, held at Connecticut College in New London.

Under the direction of President Peter Cannell, the Long-term Planning Committee and other committees were restructured to help the Association consolidate policies and deal with long-term financial problems. At the

May 1990 Council and Membership meetings financial concerns dominated. The Council minutes read, "MOTION: It was moved, seconded and voted that the highest priority be given to a new membership, subscriptions, and/or fund-raising drive to increase revenue beyond the break-even level and to begin to build up cash reserves for the journal." Once again in 1989 the mist-net proceeds were required to avoid a deficit. By 1991 the Membership Committee, chaired by Greg Butcher with the aid of Martha Steele and Janet Heywood, had produced a new brochure, constructed a display board to advertise the Association at ornithological meetings, and had sent questionnaires to non-renewers.

The Council voted to appoint two members to a joint committee of OSNA to explore the feasibility, organization, and possible functioning of an Ornithological Council that would introduce scientific ornithological information into public affairs. In November 1990 in Washington D.C., President Cannell and David Blockstein represented AFO in a meeting to discuss the creation of an Ornithological Council. In 1991 Council voted to support the intent of the Ornithological Council, but expressed concern over the possible financial implications.

The grip of financial crisis began to ease. The treasurer stewardships of Martha Vaughan, who instituted sound book-keeping methods, and George B. Mock further professionalized the conduct of the treasurer's office. The membership increase associated with the Association's joining OSNA resulted in the journal finishing in the black in 1991 for the first time in many years. The mist-net proceeds could now be added to general funds. The Council minutes of March 1991 reported that the Association had gained 521 new members in 1988, 463 in 1989, and 266 in 1990, bringing total memberships and subscriptions to 2551, but that the "OSNA joining bonus" had been used up as there were no further gains in 1991.

In the April 1992 Council meeting, with President Edward H. Burtt, Jr. presiding (Fig. 11), joining the Ornithological Council was discussed again and although there was consensus regarding the desirability of a Council, there was no consensus on imposing a surcharge on Association members to support it. Council authorized Brian Harrington to computerize the mist-net business and implement its expansion. The financial benefits of increased membership were continuing to be felt and the income of the Association, including interest from investments, passed the $100,000 mark, necessitating the inclusion of a review report by a professional accountant in the annual report submitted to the Commonwealth of Massachusetts. In August 1993, the Association was notified that it had become the beneficiary of a $300,000 bequest from the estate of Charles Blake, a past President of the then Northeastern Bird-Banding Association. At the 1993 annual Council meeting at the Isles of Shoals Marine Lab,

Fig. 11. Left to right: John C. Kricher, Elissa M. Landre, Edward H. Burtt, Jr., and William E. Davis, Jr., all presidents of AFO, 1998. Courtesy of Elissa Landre.

Appledore Island, Maine, with President Burtt presiding, an endowment policy was adopted that included the treasurer maintaining all restricted money in a combined endowment fund. Much of the endowment money was invested in mutual funds. The other financial news was also good, with Mrs. Bergstrom donating $1000 to the Bergstrom fund for the 14th consecutive year, and 27 % of authors paying full page charges to the journal. In 1993 the Association surpassed the Wilson Ornithological Society in total membership, making it the third largest OSNA society with a total membership hovering around 3000.

By the September 1994 joint meeting with the Federation of New York State Bird Clubs in Rosendale, New York, with President Greg Butcher presiding, most of the Council business dealt with national business. The Association was contributing $200 a year to be a member of the Ornithological Council, and negotiations were progressing with

ABSEARCH to produce an ornithological data base from the OSNA societies' journals. Peter Cannell reported on the merger of the North American and Pan American sections of the ICBP to form the American Bird Conservancy, the lead organization for BirdLife International in the United States, and negotiations were underway to strengthen the relationship between the Association and Partners in Flight, a non-profit organization that coordinates governmental and non-governmental avian conservation projects in the Western Hemisphere. A Conservation Committee under the direction of Lise Hanners was formulating goals for the committee and the Association, and Ken Rosenberg was chairman of the Latin American Research Committee. The focus of the Association was continuing to broaden in the national and international arenas, with a particular focus on Latin America.

At the March 1995 Council meeting, the Council endorsed the inclusion of the Colonial Waterbird Society and the Raptor Research Foundation as members of OSNA. The annual meeting was in Tulsa, Oklahoma, and featured the International Conference and Training Workshop on Conservation and Ecology of Grassland Birds, co-hosted with the Sutton Avian Research Center. The growing cosmopolitan nature of the Association was underscored by the decision to hold the 1996 Annual Meeting as a joint venture with the Georgia Ornithological Society at Jekyll Island, Georgia, and the 1997 meeting as a joint meeting with the American Birding Association and Costa Rican Ornithological Association in San Jose, Costa Rica. Elissa M. Landre became the first woman president of the Association of Field Ornithologists following her many years of involvement as secretary, treasurer, and councillor (Fig. 11). Membership reached over 3100 and C. Ray Chandler had begun the transition to replace Ken Yasukawa who was stepping down as editor of *JFO* at the end of 1995. The idea of publishing a newsletter for the association received much attention, and ultimately funding was authorized for up to four issues of *AFO Afield* in 1996, with Diane L. Tessaglia as editor. The resolution to appoint two individuals to represent the Association in the proposed North American Banding Council generated much discussion and eventually was approved. The computer age arrived with the discussion of developing a home page on the World-Wide Web.

In 1996 the Bergstrom awards had $3000 allocated, there were proposals to fund partially the publication of a grassland symposium volume, a discussion was held in Council about the Association publishing a bibliographic record of Caribbean ornithology, and questions were raised about the possibility of subsidizing travel for councilors to Association Council meetings. It appeared that the recent economic gains of the Association were stimulating a spending environment that brought something of a backlash from some of the more conservative members. There was also concern about the Association's future goals and direction, and a substantial part of the March 1996 Council meeting was dedicated to goal-related discussions. At the October 1996 annual meeting in Georgia, it was decided to propose a change in the By-laws that would enlarge the Council by four members.

At the March 1997 Council meeting President Landre disclosed that three councilors had been elected to second consecutive terms in violation of the By-laws. To comply with the by-laws the three councilors resigned from the Council and then were reappointed to fill the remainder of their terms by President Landre. A discussion of By-laws changes followed and it was voted to propose to the membership a By-laws change that would restrict a councilor's term to three years but allow for election to two consecutive terms, and the number of councilors would be raised from 12 to 15. It was announced that the 1998 annual meeting would be held in St. Louis in conjunction with the other five OSNA societies. James Lowe decided to step down as editor of Resident Bird Counts (RBC) which led to indeterminate discussion about the future of the Association's publication of the Breeding Bird Census and Winter Bird Population Study of RBC. George Mock proposed, and after much discussion Council approved, to establish an AFO Council-Restricted endowment Fund of $150,000, with the details of goals and administration of the fund to be decided later. Considerable discussion focused on potential publication projects by the Association, and a Publications Committee was appointed by President Landre consisting of Ray Chandler, editor of *JFO*, and past Presidents Cannell and Davis. Council also voted that past presidents receive notice of meetings and copies of meeting minutes, with the goal of increasing the involvement of past presidents in the current organizational structure.

The 1997 meeting in San Jose, Costa Rica, was a gala affair which celebrated the 75th anniversary of the founding of the Association. It was the first international meeting held by the Association and symbolized the international scope and perspective, with an emphasis on Latin America, that the Association had achieved. The first Alexander F. Skutch Award for excellence in field studies was presented by Skutch himself to F. Gary Stiles of Bogota, Colombia. More than 350 people registered for the meeting. President Landre passed the reins of office to Charles D. Duncan, and Jerome A. Jackson was elected vice-president.

Certainly the international meeting was a fitting tribute to the 75th anniversary of the founding of the Association, a regional bird-banding organization that had evolved into a broadly based international ornithological organization of more than 3000 members. The Association possessed a growing endowment and financial stability, and an internationally respected journal of field ornithology—factors that should make the Association of Field Ornithologists a major force in ornithology into the indefinite future.

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Table 1. Officers and Councillors of the Association of Field Ornithologists (New England Bird-Banding Association, Northeastern Bird-Banding Association)

OFFICERS AND COUNCILLORS

President	
Edward H. Forbush	1922
Charles W. Townsend	1923
Alfred O. Gross	1924-1925
Francis H. Allen	1926-1927
Francis Beach White	1928-1929
Laurence B. Fletcher	1930-1933
Frederick A. Saunders	1935-1940
Lawrence B. Chapman	1941-1947
Charles H. Blake	1948-1956
Edwin A. Mason	1956-1962
Charles E. Huntington	1962-1967
James Baird	1967-1971
John H. Kennard	1971-1973
James O. Seamans	1973-1978
Robert P. Yunick	1978-1981
George A. Clark, Jr.	1981-1984
John C. Kricher	1984-1987
William E. Davis, Jr.	1987-1989
Peter F. Cannell	1989-1991
Edward H. Burtt, Jr.	1991-1993
Gregory S. Butcher	1993-1995
Elissa M. Landre	1995-1997
Charles D. Duncan	1997-1999
Jerome A. Jackson	1999-
1st Vice-President	
Charles W. Townsend	1922
Winsor M. Tyler	1923
Charles L. Whittle	1924-1925
2nd Vice-President	
James Mackaye	1922
Alfred O. Gross	1923
Henry S. Shaw, Jr.	1924-1925

Vice-President

Francis Beach White	1926-1927; 1930-1946
Henry S. Shaw, Jr.	1926-1933
Charles L. Whittle	1926-1946
Harrison F. Lewis	1926-1954
Lawrence B. Fletcher	1928-1929; 1934-1953
Francis H. Allen	1928-1937
Donald McMillan	1929-1931
John B. May	1935-1940
James L. Peters	1938-1952
Wendell P. Smith	1941-1953
W. Elmer Ekblaw	1947
Alfred O. Gross	1947-1955
Oliver O. Austin, Jr.	1952-1956
C. Russell Mason	1954-1955
Mrs. B. M. Shaub	1954-1957
T. H. Foster	1955-1959; 1959-1960
J. Archibald Hagar	1955-1960
Richard M. Hinchman	1955-1958
Parker Reed	1956-1961
Mrs. J. R. Downs	1957-1959
Roland C. Clement	1958-1960
H. E. Harlow	1959-1960
L. M. Bartlett	1961-1964
James Baird	1964-1967
James O. Seamans	1967-1970
John H. Kennard	1970-1971
E. Alexander Bergstrom	1971-1973
Deborah Howard	1973
James B. Hallett	1973-1977
Robert P. Yunick	1977-1978
Mrs. F. David Lapham	1978-1980
George A. Clark, Jr.	1980-1981
Susan Roney Drennan	1981-1983
John C. Kricher	1983-1984
William E. Davis, Jr.	1984-1987
Peter F. Cannell	1987-1989
Edward H. Burtt, Jr.	1989-1991
Gregory S. Butcher	1991-1993
Elissa M. Landre	1993-1995
Charles D. Duncan	1995-1997
Jerome A. Jackson	1997-1999
Scott Sutcliffe	1999-

Secretary and Treasurer

Lawrence B. Fletcher	1922
Charles B. Floyd	1928-1950
Richard M. Hinchman	1951-1954
Daniel P. Johnson	1954-1957
Roland C. Clement	1957-1958
Hugh E. Harlow	1958-1959

Corresponding Secretary

Lawrence B. Fletcher	1923-1927

Recording Secretary

Alice B. Harrington	1922- ?

Secretary

Roland L. Sargent	1959-1962
Daniel P. Johnson	1962-1964
Joseph A. Hagar	1964-1968
Deborah V. Howard	1968-1979
Sarah B. Laughlin	1979-1989
Elissa M. Landre	1989-1992
Lisa C. Wahle	1992-1993
George Gale	1993-1996
W. Russ McClain	1996-1999

Treasurer

Charles B. Floyd	1923-1927
Elizabeth Downs	1959-1974
Lydia L. Kennard	1974-1976
Robert H. Shaw	1976-1978
Margaret Bon	1978-1980
Elissa M. Landre	1980-1982
Anthony J. Lauro	1982-1985
Scott Sutcliffe	1985-1989
Martha Vaughan	1989-1991
George B. Mock	1991-

Assistant Treasurer

Brian Harrington	1981-
Cindy Youngstrom	1981-1985
Elissa M. Landre	1982-1983
James Seamans	1982-1985

Editor *Bull. NEBBA; B-B; JFO*

Charles L. Whittle	1925-1939
James L. Peters	1939-1950
E. Alexander Bergstrom	1951-1971
David W. Johnston	1972-1980
Jerome A. Jackson	1980-1985
Edward H. Burtt, Jr.	1986-1990
Ken Yasukawa	1991-1995
C. Ray Chandler	1996-

Literature Review Editor

John B. May	1930-1933
Margaret M. Nice	1933-1942
Thomas T. McCabe (Associate Editor)	1936-1945
Donald S. Farner	1943-1952
Oliver L. Austin, Jr.	1952-1963
David W. Johnston	1964-1968
Jack P. Hailman	1965-1972
Bertram G. Murray, Jr..	1973-1978
Edward H. Burtt, Jr.	1979-1985
Jerome A. Jackson	1986-1990
John A. Smallwood	1991-1994
Robert C. Beason	1994-1997
Danny J. Ingold	1997-

Councillor

John E. Thayer	1922
John C. Phillips	1922
William P. Wharton	1922
Aaron C. Bagg	1922-1923
Arthur C. Bent	1922-1923
Charles L. Whittle	1922-1923
Francis H. Allen	1923-1924

Frederick A. Saunders	1923-1924; 1925-1927; 1928-1930; 1945-1948
Ralph Lawson	1923-1924
Richard B. Harding	1924-1925
Wendall P. Smith	1924-1925
Winsor M. Tyler	1924-1925; 1928-1930; 1945-1948; 1948-1951; 1951-1954
Francis H. Allen	1925-1927
Frederick H. Kennard	1925-1927
Lewis McI. Terrill	1926-1928
Robie W. Tufts	1926-1928
Elsie M. Cooledge	1926- ?
Alfred O. Gross	1926
R. O. Montambault	1926-1928
Mrs. Horace C. Dunham	1927-1929
Richard B. Harding	1927-1929
John B. May	1927-1929
Wendell P. Smith	1928-1930
???	
Oliver L. Austin, Sr.	1945-1948; 1948-1951; 1951-1954
Richard L. Weaver	1946-1949
William P. Warton	1946-1949; 1949-1952; 1952-1955
Mrs. Kenneth Wetherbee	1947-1950; 1950-1953
Mrs. Charles L. Smith	1947-1950; 1950-1953
Oscar M. Root	1947-1950; 1950-1953; 1957-1960; 1960-1963
Benjamin M. Shaub	1948-1951; 1951-1954
C. Russell Mason	1949-1952; 1952-1955
Edwin A. Mason	1946-1949; 1949-1952 1954-1955
Mrs. James F. Nields, Jr.	1953
E. Alexander Bergstrom	1952-1955
G. E. Ramsdell	1955-1957
John H. Conkey	1953-1955; 1958-1960
G. Hapgood Parks	1953-1955
Parker C. Reed	1953-1955; 1961-1965; 1968-1972
J. Archibald Hagar	1954-1955; 1960-1964; 1970-1974

Raymond A. Paynter, Jr.	1954-1956; 1959-1962
Mrs. E. P. Cook	1955-1957
Elizabeth Downs	1955-1957; 1974-1978
Cora Wellman	1955-1956
Richard Hayes	1955-1956; 1958-1961
J. W. Stewart	1955-1958
James Baird	1955-1958; 1961-1964
L. M. Bartlett	1955-1958; 1965-1969
Oliver L. Austin, Jr.	1956-1959
William H. Drury, Jr.	1956-1959; 1961-1965; 1978-1982
Ernst Mayr	1956-1959
Charles E. Huntington	1957-1960; 1960-1963
W. G. Sheldon	1957-1960; 1960-1963
Richard M. Hinchman	1960-1961
D. P. Johnson	1958-1961
Richard J. Eaton	1959-1962
A. M. Bagg	1959-1962
T. H. Foster	1960-1964
H. E. Harlow	1960-1964
Marion A. MacDonald	1964-1965
Kathleen S. Anderson	1962-1966; 1969-1973; 1975-1979; 1984-1988
Angus Black	1962-1966
R. L. Sargent	1962-1966
John H. Kennard	1963-1967
Mrs. Jeptha Wade	1963-1967
W. O. Downs	1963-1967
Donald H. Wilkins	1964-1968
Kurt R. Groote	1964-1968
James O. Seamans	1964-1967; 1971-1975
Mrs. F. J. Beecher	1965-1969
Ruth A. Lof	1965-1969
Mrs. John Fiske	1966-1970; 1971-1975
James B. Hallett	1966-1970
F. Burton Whitman	1966-1970
David Doubleday	1967-1971
Gordon Johnson	1967-1971
R. F. MacLachlan	1967-1971
Roger W. Lawrence	1968-1972
Mrs. Glen Metcalf	1968-1972

Frederick Davis	1969-1973; 1973-1977; 1979-1983
Douglas L. Kraus	1969-1973
Gordon Loery	1970-1974
Mrs. Wallace W. Smyth	1970-1974
Mrs. Daniel J. Regan	1971-1974
Brian Harrington	1972-1976; 1980-1983; 1985-1989
Ian C. T. Nisbet	1972-1976
Cynthia Youngstrom	1972-1976
George A. Clark, Jr.	1973-1977; 1978-1982
Richard B. Farrar, Jr.	1973-1977
Robert E. Gobeil	1973-1975
Elizabeth Phinney	1975; 1975-1979
Gilbert F. Fernandez	1974-1978
Robert P. Yunick	1974-1978
Sarah B. Laughlin	1975-1979
Margaret Bon	1977-1978; 1980-1982
Robert H. Shaw	1978-1980
Susan R. Drennan	1976-1980; 1983-1987; 1988-1989
John P. Merrill	1976-1980
Valerie M. Freer	1977-1981; 1981-1985; 1989–1992; 1995-1999
Trevor Lloyd-Evans	1977-1981; 1981-1985
Scott Sutcliffe	1977-1981; 1981-1985
Elissa M. Landre	1978-1980; 1983-1987
Linda Leddy	1979-1983
Robert C. DeWire	1979-1983
David W. Johnston	1980-1984
Jo Kixmiller	1980-1984
Wayne R. Petersen	1980-1984; 1986-1990
Peter Cannell	1982-1986
Susan M. Smith	1982-1986
John C. Kricher	1982-1983
Milan G. Bull	1983-1986
Thomas Litwin	1983-1987
Helen Hays	1984-1988
Carol F. Smith	1984-1988
Fred C. Sibley	1985-1989
Carl Trichka	1985-1989
Robert A. Askins	1986-1990

Christopher C. Rimmer	1986-1990
Gregory Butcher	1987-1991
Elizabeth Mallory	1987-1991
John A. Shetterly	1987-1991
Frank B. Gill	1988-1992
Roger F. Pasquier	1988
Stanley E. Senner	1988-1990
Bruce M. Beehler	1989-1993
Erica H. Dunn	1989-1993
Julie Zickefoose	1989-1993
P. A. Buckley	1990-1994; 1994-1998
Debra Miller	1990-1994
Nathaniel Wheelwright	1990-1994
Alan Poole	1991-1995
Peter D. Vickery	1991-1995; 1995-1999
Joseph M. Wunderle, Jr.	1991-1995
Jonathan L. Atwood	1992-1992
Martha Steele	1990-1992; 1992-1996
David F. Westneat	1992-1996
Margaret C. Brittingham	1992-1996; 1996-1998
Jim Berry	1993-1997
Lise A. Hanners	1993-1997
Ken Rosenberg	1993-1997
Paul J. Baicich	1994-1998
Charles D. Duncan	1994-1998
Scott K. Robinson	1995-1999
Peter Stangel	1996-2000
James Herkert	1996-2000
Donald E. Kroodsma	1997-
Francisco Vilella	1997-
Elizabeth Brooks	1997-

9

The Colonial Waterbird Society: The First Twenty Years

William E. Davis, Jr. [1]

ABSTRACT.—The Colonial Waterbird Society (CWBS) traces its origins to the early 1970s when emerging world-wide interest in colonially breeding waterbirds and their conservation stimulated eastern North American biologists to plan a formal organization analogous to the then recently formed Pacific Seabird Group (PSG). The 1976 North American Wading Bird Conference in Charleston, South Carolina, sponsored chiefly by the National Audubon Society, provided the catalyst for the formation of the Colonial Waterbird Group. Some initial acrimonious debate concerning the range of taxonomic groups to be included ("long-legged" vs. "short-legged" species) abated, with the Group embracing all colonial waterbirds in the broadest context. For several years contributed papers at annual meetings were published in *Proceedings* volumes, that, despite the constraints of limited finances, became the fully refereed journal *Colonial Waterbirds* in 1981. The journal, together with the persistence of Group leaders, attracted an expanded membership and a more international representation. One consistent frustration, however, has been the failure to achieve closer ties (e.g., a jointly published journal) with the PSG. The *Newsletter*, now *Bulletin*, has provided a vehicle for shared research interests among a diverse international membership. The change of name from "Group" to "Society" in 1986 signaled a further maturation, and its acceptance as an important national and international organization was demonstrated in 1995 by the inclusion of the CWBS in the Ornithological Societies of North America (OSNA).

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GENESIS

The 1970s was a period of expansion, growth and vigor for North American ornithology, particularly for the area of colonially breeding waterbirds. The numbers of major papers and notes published in the four major North American ornithological journals (*The Auk, The Condor, Bird-Banding/Journal of Field Ornithology, The Wilson Bulletin*) increased substantially from 1965-1980 (Fig. 1). The increase in the percentage of papers dealing with colonial waterbirds published in the late 1960s-1970s suggests a disproportionate increase in the scientific study of colonial waterbirds. A leveling in the total number of papers published in the four major journals in the late 1970s and early 1980s coincides with the publication of the *Proceedings* of the Colonial Waterbird group and beginning in 1981 the fully refereed journal *Colonial Waterbirds* (Fig. 2). This is consistent with the hypothesis that the existence of a publication outlet for papers on colonial waterbirds had a substantial impact on the flow of these papers to the major journals.

Factors responsible for the burgeoning interest in ornithology in general, and colonial waterbirds in particular, were varied, but the emergence

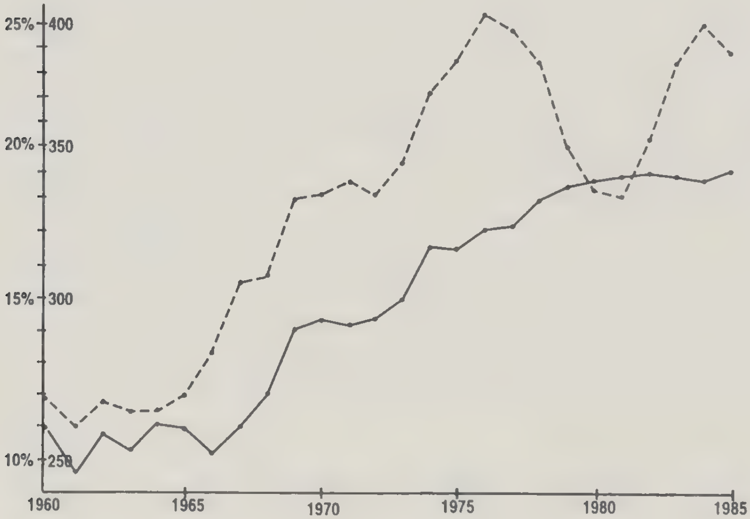

Fig. 1. Solid line: percentage of major papers and notes dealing with colonial waterbirds of total papers and notes published in *Auk, Condor, Bird-Banding J. Field Ornithology*, and *Wilson Bulletin*. Broken line: total major papers and notes in *Auk, Condor, Bird-Banding J. Field Ornithology*, and *Wilson Bulletin*. Data points were computed as three-year running averages.

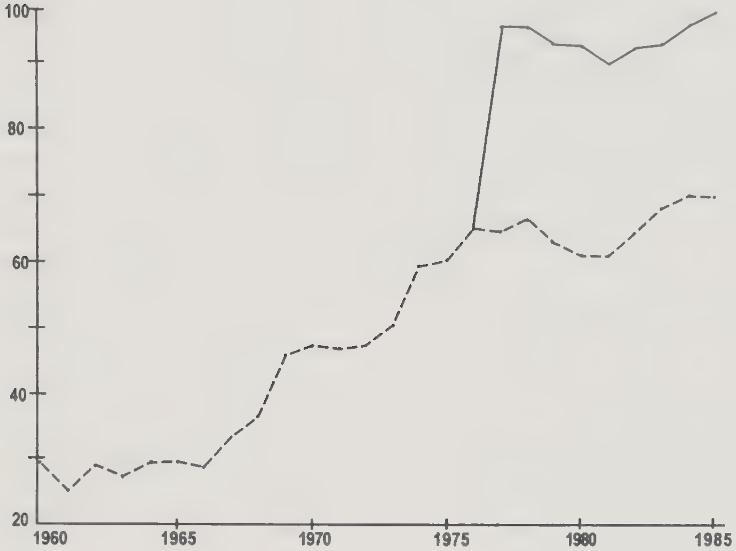

Fig. 2. Broken line: total major papers and notes on colonial waterbirds published in *Auk, Condor, Bird-Banding/J. Field Ornithology,* and *Wilson Bulletin.* Solid line: total major papers and notes on colonial waterbirds published in the four journals plus those in *Proceedings* of annual meetings and *Colonial Waterbirds.* Data points were computed as three-year running averages.

of colonial waterbirds as focal study animals was influenced by the growing interest in the potential use of colonial waterbirds as environmental indicators, especially as monitors of pesticide contamination. The colonial nature of the birds facilitated attainment of large sample sizes for analysis. A growing national and international concern for conservation, together with the rapid degradation of inland wetlands and coastal habitats, raised levels of concern among biologists worldwide. The colonial nature of many waterbirds makes them especially vulnerable to environmental disasters such as oil spills, and to critical habitat loss. The threat of expanded offshore oil drilling was of widespread concern on both coasts, and the passage of the National Environmental Policy Act (NEPA) in 1972 and the Endangered Species Act in 1973 focused attention on a number of waterbird species. Many biologists employed in a variety of governmental positions perceived a need to provide technical advice to governmental agencies in managing public lands containing colonial waterbird resources. A need for formal structures to channel attention and research on colonially breeding birds clearly existed by the early 1970s.

The interest in colonially breeding waterbirds was world-wide. In 1966 the Seabird Group of the United Kingdom was established, the Australasian

Seabird Group was established in Australia in 1971, and the Southern African Seabird Group in 1976. In North America the Pacific Seabird Group (PSG) was founded in 1974 on the west coast. At the inaugural meeting of the PSG in December 1974, three east-coast seabird/colonial waterbird biologists, William Drury, Francine G. Buckley and P. A. Buckley, attended the meeting and proposed that an Atlantic Coast section of the PSG be established. The general consensus of the PSG membership and Council was that, although they sympathized with the concerns and lauded the idea, they felt that it would be better if a separate east group were established. An Atlantic Coast PSG section might dilute the emphasis on Pacific coast seabirds, and might emphasize taxonomic groups, such as wading birds, which are not seabirds (P. A. Buckley, pers. comm.).

In December 1975, P. A. and F. G. Buckley convened a meeting at the Massachusetts Audubon Society headquarters involving nearly 20 east-coast waterbird biologists, among them four future presidents of the Colonial Waterbird Society. The purpose of the meeting was to gain consensus on a broad spectrum of colonial waterbird-based conservation and management concerns and problems that arose in the course of development of the Buckleys' *Guidelines for the Protection and Management of Colonially Nesting Birds* (Buckley and Buckley 1976). At that meeting a need for some formal organization that could unite science and management of all colonial waterbirds was identified.

Around the same time, but independently of the Massachusetts Audubon meeting and discussions, the National Audubon Society (NAS) Research Department had organized the North American Wading Bird Conference, with $25,000 provided by the NAS to cover conference costs and publish its *Proceedings*. The U.S. Fish and Wildlife Service became a second sponsor. The conference steering committee was co-chaired by Alexander "Sandy" Sprunt and John Ogden, both based in Florida, with Mitchell Byrd, Thomas Custer, Kirke King, Donald McCrimmon, Douglas Mock, and Donald Woodard as other committee members. Conference goals included: (1) providing a major forum for communication among wading bird biologists, and (2) creating a process for the formation of a "Colonial Wading Bird Group" (Ogden, pers. comm.).

The North American Wading Bird Conference was to be held at Charleston, South Carolina, on 14-17 October 1976. A questionnaire designed to measure interest of biologists and conservationists in the formation of a Wading Bird Group (WBG) was sent with the preliminary announcement of the Wading Bird Conference to about 200 individuals. The 90 questionnaires returned indicated strong support for the formation of a WBG, with respondents from 32 states, Canada, Mexico, Great Britain and Australia indicating support. The results of the questionnaire were published in Volume 1, Number 1 of a *North American Wading Bird Group Newsletter*, dated 1 September 1976, more than a month before the Wading Bird Conference in Charleston. The newsletter contained the names and addresses of respondents to the questionnaire and a statement outlining their particular expertise or interest. The report on the results of the questionnaire included a statement that at the Conference there would be a meeting to formally organize the WBG and discuss its structure, and that for 1977 the WBG would be administered by a *pro tempore* executive committee selected by the steering committee for the Conference. The thirteen members of that pro tempore committee were listed. Hence it appeared that the CWG was a *fait accompli*. Only one future President of the CWG, the founding president John Ogden, was among those names.

A number of biologists who were working with colonial waterbirds other than wading birds (e.g., gull, terns, skimmers) were also planning to attend the Wading Bird Conference. On the next to last of the 25 pages of the newsletter, following the announcement and particulars of the Wading Bird Conference, Francine G. Buckley's announcement beginning "*Colonial Waterbird Group*:" appeared. It outlined the results of the aforementioned meeting at the Massachusetts Audubon Society including the strong sentiment for the formation of a formal group for "the exchange of information of the biology and conservation of colonial waterbirds." The following functions of the proposed group were enumerated: "(1) to make all colonial waterbird workers aware of each other and their interests; (2) to facilitate discussion of common problems in waterbird biology; (3) to act as the body of credibility to influence policy makers in matters concerning colonial waterbirds; (4) to act as an available resource for whoever needs advice on colonial waterbirds; (5) to monitor colonial waterbird populations on systematic bases using commonly developed and standardized techniques; (6) to facilitate application of research results directly to management and conservation without the need for technically less sophisticated intermediaries." Discussion of the details of the formation of a Colonial Waterbird Group (CWG) would occur at the Wading Bird Conference. Hence the formation of both the WBG and CWG were to be formally discussed at the same meeting. The stage was thus set for the discussion of whether there should be one group or two, and the two factions—"long-legged" (wading birds) and "short-legged" (gulls, terns, etc.)—factions quickly polarized.

The first night of the Wading Bird Conference the two factions met separately and discussed pros and cons of the competing proposals among themselves. On the last night of the conference everyone met together and argued well into the night. The discussions, which eventually broadened to envision the establishment of a working group including all colonial waterbirds, were protracted and often heated. One wading-bird-only person is reported to have sarcastically asked why the group should not include any birds that do things in groups, like Bank Swallows and Cedar Waxwings? But finally the proponents of a more broadly based organization prevailed, and nearly everyone agreed that it would be best to establish a single organization, to be called the Colonial Waterbird Group.

At that meeting the officers of a *pro tempore* Steering Committee were elected, with John Ogden as Chair, Joanna Burger as Secretary-Treasurer, and Mitchell Byrd as Editor of the *Newsletter*. Other members of the Steering Committee were P. A. Buckley, Francine G. Buckley, Ronald Ryder, Donald McCrimmon, Robert Dickerman, Helen Pratt, and Range Bayer—a comfortable blend of "long-legged" and "short-legged" people. Michael Gochfeld was to head a committee to draft a set of by-laws (Burger 1981). The dues were set at $5 to cover the costs associated with the *Newsletter* and arranging the annual meeting. The next *Newsletter*, published 1 February 1977, saw a name change to *Colonial Waterbird Group Newsletter*, Volume 1, Number 2, signifying the merging of the wading bird and seabird interests into a single group.

The immediate goals of the CWG were enumerated: "(1) Encourage and coordinate standardized surveys of colonial waterbirds. (2) Publish a newsletter. (3) Assist efforts by conservationists related to protection and management of colonial waterbirds, and wetland and coastal ecosystems. (4) Act as a clearinghouse of information for ongoing research and research opportunities." In pursuance of item (4) the second newsletter announced that future newsletters would contain regional reports of research activities relating to colonial waterbirds, and listed regional editors and compilers, and provided a map delineating the regions.

The conference proceedings were eventually published by the National Audubon Society (Sprunt et al. 1978), and the goals and purpose of the CWG were summed up by John Ogden in the Preface: "The CWG, as envisioned, will improve communication between wading bird biologists and conservationists in the United States, Canada, Mexico, and the West Indies through newsletters, annual conferences, and formation of subgroups to deal with special topics" (Ogden 1978).

Volume 1, Number 3 of the CWG *Newsletter* contained an announcement of the 1977 annual meeting, to be held on 21-23 October at Northern Illinois University, DeKalb, with William Southern as chair of the local committee. The major objectives of the business meeting at the conference were to be the formal election of officers (Table 1) and the adoption of bylaws, to be proposed by nominating and by-laws committees. Ninety-two people attended the DeKalb meeting and the objectives above-stated were duly accomplished. Three standing committees were established:

Survey-Census (Don McCrimmon, Chair), Conservation (Environmental Advisory Committee) (James Rodgers, Chair), and Membership (Thomas Custer, Chair). An ad hoc Color-marking Protocol Committee was appointed by President Ogden with William Southern as Chair with the directive to discuss the possible coordination of a regional or national color-marking scheme with George Jonkel of the U.S. Fish and Wildlife Service Bird Banding Laboratory. The treasury of the CWG contained $1020, including $500 from the National Audubon Society. Membership total was 153. It was agreed that a *Proceedings* volume should be published that contained the papers presented at that annual meeting, and William Southern agreed to compile and edit the volume. By early 1978 the *Proceedings* of the 1977 annual conference was for sale for $7.50 each (Southern 1978).

The Colonial Waterbird Group was now a formal organization with a set of adopted by-laws, elected officers and council, a treasury, a *Newsletter*, an embryonic journal, and a committee structure. It was the end of the beginning.

CONSOLIDATION

In 1978 three new Council members (Table 1) were elected by ballots disseminated in the *Newsletter*, and the second annual meeting was held at the American Museum of Natural History in New York City, 20-23 October, jointly sponsored by the Linnaean Society of New York. Approximately 250 people attended the meeting. The first day and a half was occupied by symposia on factors affecting nesting success of colonial waterbirds and colonial waterbird census methods, organized by the Linnaean Society as part of their centennial celebration. In the next day and a half, 30 submitted papers were presented. The submitted papers were published in Volume 2 of the *Proceedings* (Southern 1979), and invited symposium papers were published by the Linnaean Society as a *Transactions* volume (Weinberger 1980).

Formal discussions about improving relations with the Pacific Seabird Group (PSG) began in 1978 at the CWG executive council meeting in October, and at the PSG council meeting in December in Asilomar, California. Ensuing discussions resulted in agreement that the organizations should remain separate, but that a joint meeting in the near future was desirable. Further, strong interest was expressed in the possibility of publishing a joint seabird-colonial waterbird journal—the pooled talents and resources improving the probability of success. A joint "interaction committee" was to be formed, consisting of the President of the CWG and

Chairman of the PSG plus two other members from each organization, and a questionnaire prepared and distributed to both memberships soliciting input on the future interaction of the groups. Thus began a series of protracted, frustrating, and largely unproductive attempts to bring the groups closer together.

At the council meeting it was proposed that the dates of publication of the newsletter should be August, to announce forthcoming annual meetings, and February to disseminate the results of those meetings. Regional reports occupied the bulk of the second newsletter in 1977 and 1978. A second printing of 100 copies of the 1977 conference *Proceedings* was made since the first printing had sold out.

After two annual meetings in the northern U.S., the third annual meeting was held in Lafayette, Louisiana, 25-28 October 1979, with 107 people in attendance. At the council meeting it was decided that the CWG would be incorporated in New Jersey, since New Jersey was one of the few states not requiring an in-state annual meeting. Michael Gochfeld and Joanna Burger would help facilitate the incorporation. The results of the questionnaire regarding closer ties to the PSG indicated that CWG membership favored closer ties, with occasional joint meetings and committees, but was not in favor of a merger. Michael Erwin became chair of the Survey and Census Committee, and John Wiese became chair of the Membership Committee. The meeting was highlighted by the first field trip, a half-day excursion to Avery Island and the McIlhenny egret rookery platforms and a visit to the Tabasco factory. It was a festive meeting featuring crawfish étouffé at the Evangeline Seafood House, and the first banquet—albeit without President Ogden in attendance because of a conflict in scheduling. The egalitarian tradition of not having a head banquet table for officers began at this meeting. The *Proceedings* were duly published (Southern 1980).

The fourth annual meeting, presided over by President P. A. Buckley, was held in Ottawa, Ontario, Canada, 9-12 October 1980. A number of decisions were made at this meeting that were to have a lasting impact on the CWG. The office of vice-president was officially recognized as president-elect. The first symposium at an annual meeting—on investigator disturbance and human disturbance—was held, and Joanna Burger started the tradition of the vice-president organizing a symposium at each meeting. The decision to incorporate in New Jersey was reiterated and progress reported. At the general business meeting a student award (a free membership for one year) for the best student paper at the meeting was established.

Perhaps the most significant decision since the formation of the CWG was made at the council meeting when it was decided that a new, fully-refereed journal, *Colonial Waterbirds*, would replace the *Proceedings* volumes containing the papers given at the annual meetings for the previous three years. Herbert Kale was elected the journal's first editor, and a standing Editorial Committee, with members having three-year terms, was established. The journal was restricted to one issue per year until council became convinced of its viability as an accepted international scientific journal and the financial situation and manuscript flow made the publication of multiple issues viable. A further constraint was that manuscripts submitted for consideration for publication must have been presented at the annual meeting, either orally or by poster. Editor Kale was given the authority to reject manuscripts at his discretion. To acknowledge that *Colonial Waterbirds* was the lineal organizational descendant of the *Proceedings*, the council voted that the first volume would be number four.

The decision to convert the proceedings into a refereed journal was neither quick nor easy. The first written mention of the possibility of publishing a journal was in President John Ogden's message in the August, 1979 *Newsletter*, but it had been an ongoing consideration in many peoples' minds since the genesis of the CWG (P. A. Buckley pers. com.). At the 1980 council meeting, the debate was protracted, with the considerable financial responsibilities of a journal a focus of the debate. President P. A. Buckley chaired the meeting and strongly supported the establishment of the journal. The final vote brought *Colonial Waterbirds* into existence.

In recognition of the financial responsibilities a journal would entail, the council voted to increase dues for individuals from $5 to $20, with student membership increased to $15, and institutional membership to $25. The increased dues, however, included *Colonial Waterbirds*, while the *Proceedings* had not been included with membership. There were numerous complaints about the dues increase and the general acquisition of structure that the CWG had experienced in its first five years. A defense of the CWG structure is summed up in an excerpt from a letter from Editor Kale to an individual who had resigned from the organization following the establishment of *Colonial Waterbirds* and the dues increase: "As to your regrets that we have evolved in 5 years from an informal 'group' for information exchange to a formal journal-producing society, well, we became formalized at our very first meeting (second after Charleston) in DeKalb, and elected officers, established by-laws, dues, etc. and that very first year began producing a 'journal.' Each year we have had the same type of group meetings for information exchange etc. So what is now different about our group from four years ago, other than the Proceedings being called 'Colonial Waterbirds,' and our dues being increased to enable us to produce the journal on a sounder financial basis?" (Kale 1981).

The 1981 annual meeting, 29 October-1 November, at Corpus Christi, Texas, was presided over by President P. A. Buckley. It had been planned as a joint meeting with the Pacific Seabird Group, but the PSG at the last minute decided that they would not participate. The symposium topic was "Factors Affecting Reproductive Success." At the council meeting the scope of *Colonial Waterbirds* was expanded by authorizing the editor, at his discretion, to include papers not given at the annual meeting, and to invite papers for a "contributed" issue of the journal no earlier than volume 6, if funding for a second issue became available. A fund-raising committee, chaired by Joanna Burger was established, and a general feeling of financial urgency, brought on by the expenses associated with the new journal, was pervasive.

It was announced that CWG was now finally incorporated in New Jersey. The process of incorporation had dragged on into the field season, and the lawyer handling the incorporation was left to his own devices in filling out the final forms. Hence paragraph 1C of the incorporation papers amusingly reads, "To encourage research, scholarship and academic inquiry on the subject of Colonial Waterbird activity and history, both in the colonial period and down to the present time." (Burger, pers. comm.). The Archives Committee (Michael Gochfeld, chair) ruminated about a permanent location for the CWG's burgeoning paper trail. Closer interactions with the PSG were still being considered.

By the end of President P. A. Buckley's term, December 1981, the CWG projected an image of stability: the first issue of *Colonial Waterbirds* had been published, the organization was incorporated, the transition to a financially stabilizing dues structure had been achieved, committees were proliferating as expected in any bureaucracy, and fund raising had become an ongoing focus. A mature CWG had arrived as a force in ornithology.

THE GROUP BECOMES A SOCIETY

The year 1982 began with a new slate of officers: Joanna Burger, president; Mike Erwin, vice-president; Francine G. Buckley, secretary; and Iola Price, treasurer. The major concern was improving the journal and achieving financial stability. The previous presidents had been able to secure grants from a variety of sources. John Ogden had secured a grant from the National Audubon Society, and P. A. Buckley had secured financial support from the U.S. National Park Service. Joanna Burger chaired the Development Committee that focused on fund raising and succeeded in getting a gift of $2000 from Betty Carnes, in part, at least, on the basis of

Fig. 3. Washington, D.C., 1982. From left to right: Michael Erwin, Donald McCrimmon, Joanna Burger, P. A. Buckley. Photo and caption courtesy of Joanna Burger and Michael Gochfeld.

an excellent gender mix record of the CWG both in membership and officers. The CWG had received tax-free status so that such gifts were now fully tax deductible. In a poll conducted at a general business meeting of the 1982 annual meeting (110 people registered), 4-7 November, Washington, D.C. at the National 4-H Center (Fig. 3, 4), 68 members approved, and none opposed, soliciting funds from industry. Editor Kale was authorized to solicit appropriate advertising to be run in *Colonial Waterbirds*. A policy of non-mandatory page charges was instituted. The National Audubon Society donated $1000 from its revolving publication fund to help with the publication of *Colonial Waterbirds*. The Canadian Wildlife Service donated $800. A promotional brochure was produced to help with the quest for new members. Someone suggested that the organization needed a membership of about 300 to become financially viable. Michael Erwin and Mark Shaffer received a written commitment for up to $6000 in matching funds from the U.S. Fish and Wildlife Service to help defray publication expenses.

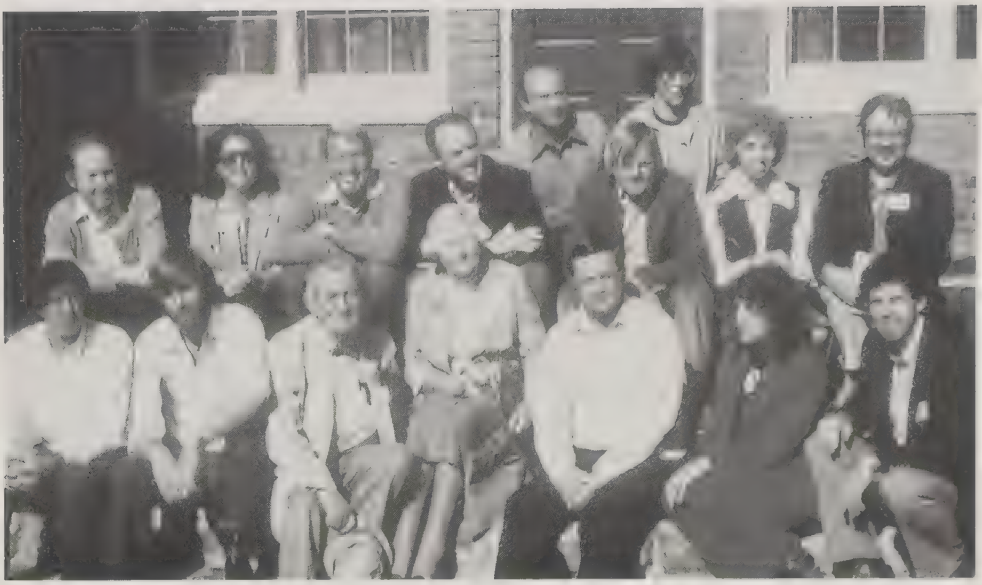

Fig. 4. Washington, D.C., 1982. From left to right: back row, Roger Evans, Francine Buckley, Alexander "Sandy" Sprunt, P. A. Buckley, Michael Gochfeld, James Kushlan, Iola Price, Mary LeCroy, Herbert Kale; front row, Ralph Morris, Doug Mock, Oliver Austin, Jr., Erma "Jonnie" Fisk, Brian Chapman, Joanna Burger, Michael Erwin. Photo and caption courtesy of Joanna Burger and Michael Gochfeld.

In other business the CWG was asked to elect a representative to the International Council for Bird Preservation (ICBP) Seabird Committee, and Hans Blokpoel was elected. The symposium at the Washington meeting, organized by Michael Erwin, was "Feeding Ecology of Waterbirds."

Brian Chapman resigned as *Newsletter* editor, and William E. Davis, Jr. was elected as his replacement beginning with the August 1983 issue. Editor Davis retained the format of the *Newsletter*, but the role of the *Newsletter* was expanded by the publication of abstracts from papers delivered at annual meetings (previously published in the *Proceedings* or in *Colonial Waterbirds*). Beginning in 1984 a third issue of the *Newsletter* was issued with March, August, and November publication dates. The March issue featured the regional reports, the August issue the membership list, and the November issue the abstracts from the papers given at the annual meeting, together with the minutes of the business and council meetings. The Regional Report section had become moribund, and with the approval of council the system of regional editor and compilers was abandoned with regional report forms included with annual dues notices, and sent directly to the *Newsletter* editor. This change resuscitated the regional report concept with about a quarter to a third of the membership sending in reports on their activities. The *Newsletter* also benefitted from regular Washington Reports by Daphne Gemmill.

The CWG council met at the American Ornithologists' Union 1983 annual meeting at the American Museum of Natural History in New York. Michael Erwin became chair of the Fund-raising Committee, and a by-laws change added the editors of the *Newsletter* and *Colonial Waterbirds* to the council as voting *ex officio* members. The 1983 annual meeting was held in San Juan, Puerto Rico, 27-30 October, presided over by President Joanna Burger. Steven Kress was, by then, chair of the Conservation Committee, which was an active standing committee. The symposium was entitled "Ecology of Waterbirds in the Caribbean," and a highlight of the meeting was a series of field trips to the Caribbean National Forest and elsewhere. Several attendees went to Culebra with Sean Furniss, the Chair of the Local Committee. This trip led to a number of collaborative research projects involving graduate students. There was a continuing effort to have graduate students attend and participate in CWG meetings. Many attendees were doubtless surprised on their arrival at the DuPont Plaza Hotel in San Juan to read the giant marquee sign, "Welcome Colonial Waterbed Group."

The 1984 annual meeting was held in Ithaca, New York, October 4-7. President Erwin appointed Linda Southern chair of an *ad hoc* Technical Advisory Committee to facilitate the use of CWG expertise by land managers and decision makers. The Color-marking Committee had become defunct. Council voted to initiate a membership drive which would be linked to the proposed 1985 joint meeting with the PSG in San Francisco, with a $5 reduction in fee to new members. Council also voted to publish two issues of *Colonial Waterbirds* each year. Fund-raising, as usual, was a major topic of discussion. By 1984, Volume 7 of *Colonial Waterbirds* was listed in Biological Abstracts, Current Contents, Science Citation Index, Wildlife Reviews, and the Zoological Record (Morris 1989).

After years of attempts, the first joint meeting with the PSG was facilitated by President Erwin and was held at San Francisco, California, 4-8 December 1985, featuring two symposia, one on gulls and one on wetlands. The meeting included a pelagic trip to the Farallon Islands. A $5000 grant from the Waterways Experiment Station, Vicksburg, Mississippi, was secured to help fund the symposia. Forty-four papers were presented in the two symposia, and 89 papers and 23 posters were presented in the general sessions. The Smithsonian Institution officially became the CWG archivist. James Kushlan was elected editor of *Colonial Waterbirds* beginning in 1986. Council voted to apply for membership in the ICBP.

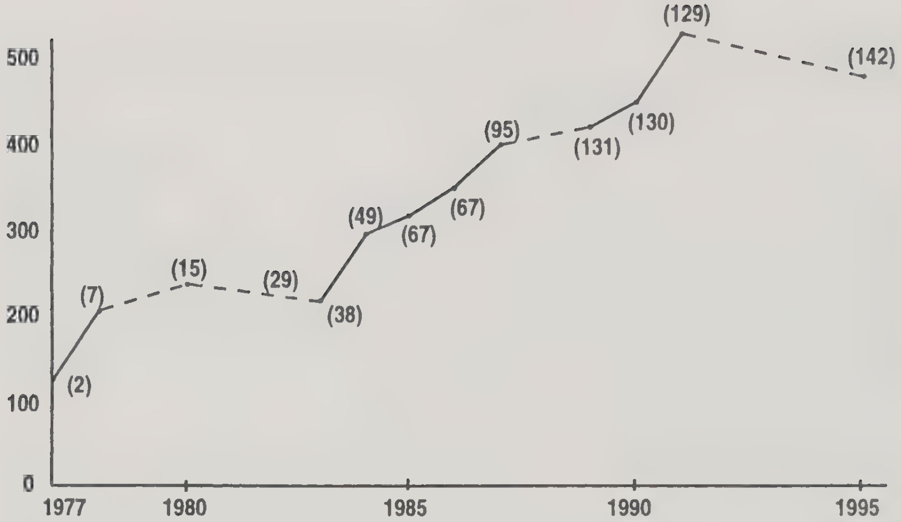

Fig. 5. Total membership (individuals, institutions, and students) in Colonial Waterbird Society (Group); institutional memberships in parentheses.

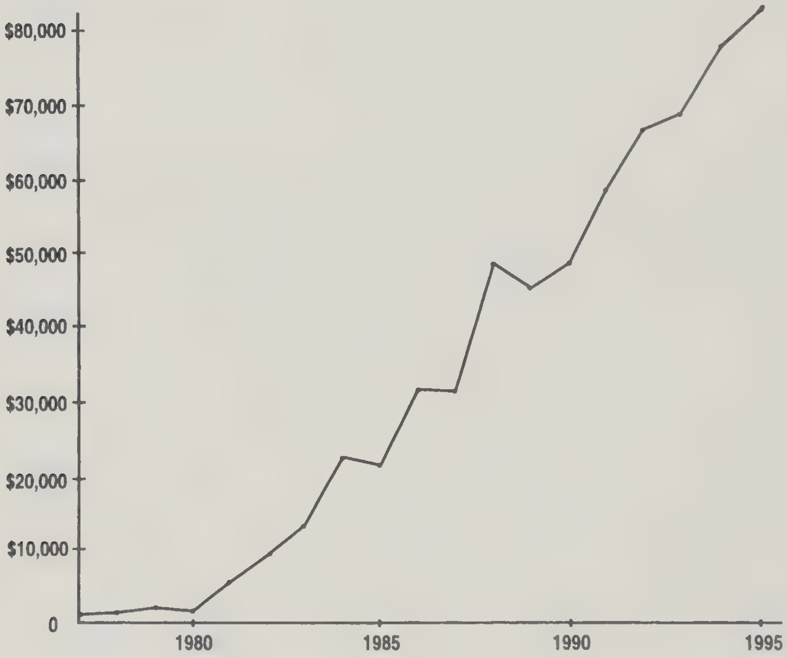

Fig. 6. Financial assets in treasury of Colonial Waterbird Society (Group).

Membership continued to grow (Fig. 5), and the grant support of *Colonial Waterbirds* made possible increased financial security (Fig. 6). Both symposia were published, the gull symposium in *Studies in Avian Biology* (Hand et al. 1987), and the wetlands symposium (Erwin et al. 1986) as Volume 9, no. 2 of *Colonial Waterbirds*. The formation of the Committee for Colonial Waterbird Information Service received plaudits from outgoing President Erwin, and incoming President William Southern. President Southern pressed hard during his presidency for expanded commitment by the CWG and its individual members to conservation initiatives.

The 1986 annual meeting of CWG was a gala affair, held from 23-26 October in Charleston, South Carolina on the tenth anniversary and at the scene of the founding of the organization (Figs. 7, 8). Ninety-three members participated. A symposium on storks attracted 16 papers. The stork symposium papers were published as volume 10, no. 2 of *Colonial*

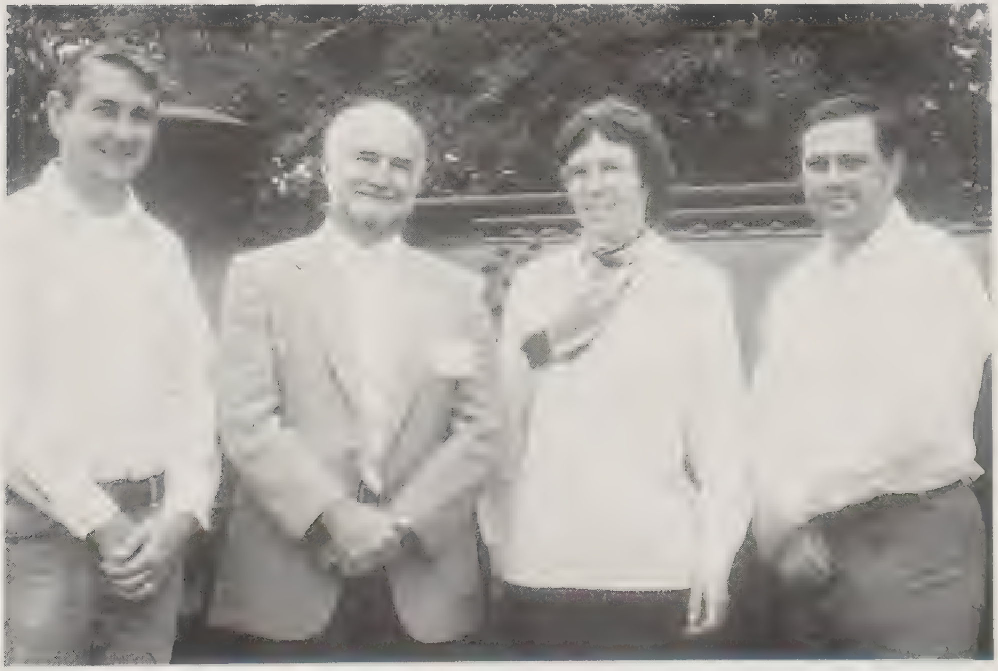

Fig. 7. Washington, D.C., 1986. Officers of the Society, from left to right: Donald McCrimmon, William Southern, Iola Price, Brian Chapman. Photo and caption courtesy of Joanna Burger and Michael Gochfeld.

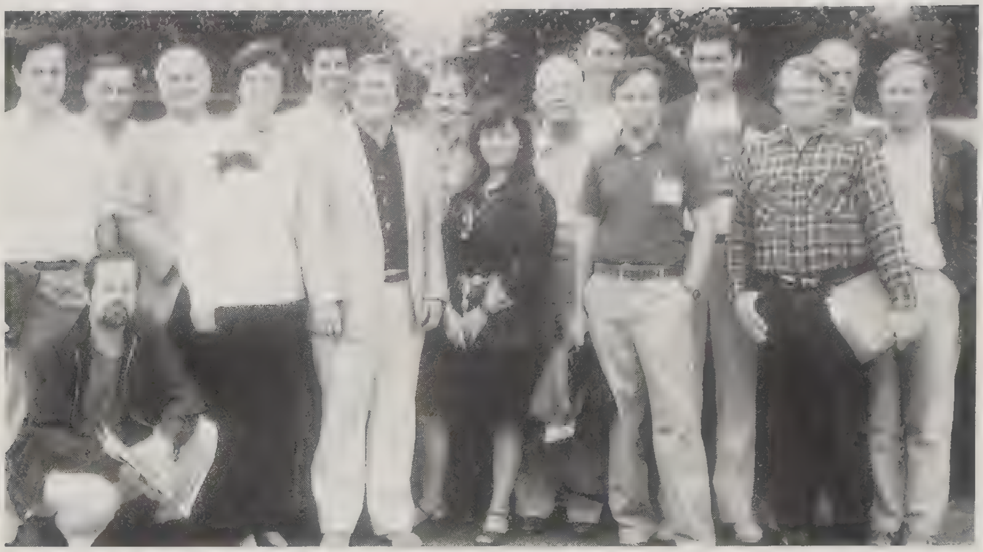

Fig. 8. Council, 1986. From left to right, standing: Jeremy Hatch, Brian Chapman, William Southern, Iola Price, Michael Erwin, William "Ted" Davis, Keith Bildstein, Joanna Burger, Julian Dusi, Donald McCrimmon, Thomas Custer, Rich Paul, Roger Clapp, P. A. Buckley, Martin McNicholl; left front: Hans Blokpoel. Photo and caption courtesy of Joanna Burger and Michael Gochfeld.

Waterbirds (Coulter and Rodgers 1987). Linda Southern, chair of the Information Service Committee, reported to council that a directory of colonial waterbird biologists had been compiled. Her request for financial support for printing was accommodated by a $500 allocation. A membership drive with the goal of securing 150 new members by the end of 1987 was funded for $2000. The Archives Committee was officially reestablished with Roger Clapp as chair, and President Southern appointed Ed Brucker and Michael Gochfeld to join him on a new Finance Committee.

Perhaps the most significant event at the meeting was the reaffirmation, after heated debate at the general meeting and a petition to the council for reconsideration, of the vote taken by mail to change the name of the organization to the Colonial Waterbird Society. The name change had been one of many by-laws changes voted on by mail after they had been announced in the August 1986 *Newsletter* by the By-laws Committee chaired by Michael Gochfeld. Part of the protest revolved around the potential for confusion if the Colonial Waterbird Society had the same abbreviation (CWS) as the Canadian Wildlife Service (CWS). This confusion was functionally eliminated by agreement to abbreviate the Colonial Waterbird Society "CWBS." One international participant, in the debate of the issues at the general business meeting, forcefully argued that as a society it would be easier to recruit international members—"group" having a rather parochial connotation. On its tenth anniversary the organization had taken another step towards establishing an international perspective and reputation.

TOWARDS AN INTERNATIONAL PERSPECTIVE

During his presidency (1986-1987), William Southern wrote to all the world seabird study organizations and invited them to join the CWBS and publish papers in *Colonial Waterbirds*. This was symptomatic of the continuing emphasis on establishing the CWBS in a truly international context. When financial considerations prompted a restructuring of the *Newsletter* with council voting to abolish the August issue, the practice of publishing the abstracts of the annual meetings in the November issue was continued, largely to make this information available to international members who could not make the annual meeting.

Colonial Waterbirds editor, James Kushlan, completed the arrangements for the journal to be included in *Current Contents*, and encouraged two classes of contributors to submit papers to the journal: seabird biologists and international authors. His strategy was to create a group of international associate editors, some of whom were seabird biologists (Kushlan 1994). The list included R. W. Furness (United Kingdom), Heinz Hafner (France), Gonzolo Morales (Venezuela), R. N. Naik (India), David Nettleship (Canada), Jan Pinowski (Poland), Wang Qishan (China), R. M. Randall (South Africa), Harry F. Recher (Australia), Roberto Schlatter (Chile), James Wiley (Puerto Rico), and Satoshi Yamagishi (Japan). By 1989, when Ralph Morris became editor, most contributed papers were by authors outside of the United States (J. Kushlan pers. com.). Editor Kushlan also eliminated the distinction between "major papers" and "notes" in order to encourage the submission of articles of the appropriate length. He also solicited book reviews, and commentary. By 1988 page

Fig. 9. Washington, D.C., 1988. The first seven presidents of the Society (Group) in chronological order of service. Left to right: John Ogden, P. A. Buckley, Joanna Burger, Michael Erwin, William Southern, Donald McCrimmon, Herbert Kale. Photo and caption courtesy of Joanna Burger and Michael Gochfeld.

charges, although not compulsory, were covering more than half the cost of publishing the journal. This meant that some of the annual dues could accrue and add to the financial stability of the society.

The 1987 meeting, 10-13 September 1987, in Thunder Bay, Ontario, Canada, was the second meeting outside of the United States. The council voted to empower the chair of the Conservation Committee (Stephen Kress) to draft letters, on behalf of the society, addressing conservation issues under the signatures of the chair of the committee and the president of the society. CWBS became the official abbreviation of the Colonial Waterbird Society. The Executive Council elected Ralph Morris as the next editor of *Colonial Waterbirds.*

The 1988 annual meeting (175 registrants), 12-16 October, in Washington, D.C. was the second joint meeting with the Pacific Seabird Group (Fig. 9). Michael Erwin served as Local Committee chair for a second time. Council, with President McCrimmon presiding, discussed the possibility of the CWBS joining the Ornithological Societies of North America (OSNA). President McCrimmon directed William E. Davis, Jr. and Iola Price to approach OSNA concerning feasibility and costs. Membership Committee Chair Roger Clapp announced that he had written 160 letters seeking new members among seabird and other waterbird biologists throughout the world—another evidence of the increasing internationalization of the CWBS. President McCrimmon established a committee to reward outstanding achievement in the study of colonial waterbirds. After a somewhat awkward political struggle Council voted that only the two immediate past presidents of the CWBS should retain voting membership on the council, and an appropriate by-laws change vote of the membership was organized. A lengthy discussion occurred on the feasibility of developing a worldwide seabird journal, with attention focused on the possibility of the PSG joining forces with the CWBS to develop *Colonial Waterbirds* in that direction. An *ad hoc* Advisory Committee consisting of President McCrimmon, Vice-president Kale, Editor Kushlan, Editor-elect Morris, and Treasurer Price was established to facilitate discussion with the PSG. After six years of service *Newsletter* Editor Davis stepped down and Francine G. Buckley became the new editor. Francesca Cuthbert became the new chair of the Membership Committee. Discussion about increasing *Colonial Waterbirds* to three issues ended in a rejection of the proposal.

The 1989 annual meeting, 26-29 October, was held at the Sheraton Resort on Key Largo, Florida, and overlapped with a multi-day Everglades Ecosystem Symposium at which one entire paper session was devoted to wading birds. It was again decided to maintain *Colonial Waterbirds* at two issues per year. Iola Price stepped down as treasurer after eight years of service and Linda Kinkel became the new treasurer. Information Service Committee Chair Lise Hanners presented a draft of the *Colonial Waterbird Information Service Directory*, with about 160 PSG and CWBS members listed. The final directory was printed in 1991.

The 1990 annual meeting, with President Herbert Kale presiding, was held from 17-19 August at Memorial University, St. John's, Newfoundland, emphasizing again the international dimension of the Colonial Waterbird Society (Figs. 10, 11). A symposium, "Warm Bodies in a Cold Ocean: Seabirds of the Northwest Atlantic" included five invited speakers. At the council meeting discussions were held with PSG representatives C. J. Ralph and Douglas Siegel-Causey concerning the possibility of joint PSG-CWBS sponsorship of a seabird journal and although the PSG was favorably inclined to enter such an agreement, there was concern about the substantial increase in dues which would result for the PSG. A subcommittee of Ian Nisbet (Chair), Ralph Morris, and Iola Price was established to con-

Fig. 10. 1990 Council. Left to right, back standing: David Nettleship, Donald McCrimmon; front seated: Ed Brucker, Ralph Morris, Katherine Parsons, Jeffrey Spendelow, Herbert Kale, Keith Bildstein, Ian Nisbet. Photo and caption courtesy of Joanna Burger and Michael Gochfeld.

tinue discussions with the PSG representatives. The subcommittee figured budget projections pre and post joint publication for two and three issues a year and presented them to council when it reconvened. Considerable further discussion revolved around the structure of a joint editorial board, financial arrangements, and the name of the joint journal which PSG members suggested should not remain "*Colonial Waterbirds.*" *Colonial Waterbirds and Seabirds, Colonial Waterbird and Seabird Journal, Marine and Colonial Waterbirds, Marine and Freshwater Ornithology, Journal of Marine and Freshwater Ornithology*, and *International Journal of Marine and Freshwater Ornithology* were alternatives proposed. There was little disagreement that, (1) the CWBS and PSG would have equal voting rights on a joint editorial board, (2) the duties of the editorial board were to hire and fire editors and establish budgets, and (3) the organizations would share the cost of the journal prorated on the number of members receiving the journal, but there was strong disagreement that the name of the journal must be changed. President Kale was directed by council to draft

Fig. 11. Group photo, 1990, St. John's, Newfoundland. Photo and caption by Joanna Burger and Michael Gochfeld.

an agreement with the chairman of the PSG on all issues to be sent to council for its approval. The PSG would poll its membership concerning the accepted draft and consider the issues at their forthcoming annual meeting.

Also at the council meeting, on the recommendation of Chairman Brucker of the Finance Committee, the council approved a motion to open an account for the CWBS endowment fund with a brokerage firm. The council also voted to increase dues to $25 per year.

The report from President Kale in the May, 1991 *Newsletter* stated that despite the fact that straw votes taken by the CWBS and PSG indicated that a majority of both memberships favored the formation of a joint journal, the PSG council had rejected the proposal for the joint venture. The motion to continue negotiations, which occurred at the PSG annual meeting in Monterey, California in January, with Keith Bildstein and Ralph Morris representing the CWBS, failed by a single vote—the deciding vote cast by the incoming chairman of the PSG. Thus another attempt at closer relations with the PSG came to a frustrating end. President Kale stated, "So, for now and the foreseeable future, *Colonial Waterbirds* (a perfectly suitable journal name that already includes all marine and freshwater colonial waterbirds) will continue as the journal of the Colonial Waterbird Society. Its pages, as always, remain open to authors throughout the world and we urge colonial waterbird biologists to avail themselves of this scientific outlet."

The 1991 annual meeting, with President Kale presiding, was held 17-20 October, at the Fort Magruder Inn and Conference Center, Williamsburg, Virginia, with the College of William and Mary hosting, and 84 people registered. Alan Feduccia was the banquet speaker, with his presentation on Catesby and his Birds of North America. Because of the satisfactory financial health of the CWBS, implementation of the dues increase which had been approved by council was postponed until 1992. The position of membership secretary, appointed by council for a three-year term, was created by council to remove from the treasurer the burden of maintaining a membership list and preparing mailing labels. The position was to carry voting rights, and the necessary by-laws changes were to be made. Mike Erwin was elected the new editor of *Colonial Waterbirds*, beginning with Volume 15. Ralph Morris's goal during his editorship of achieving an expansion of the journal to three issues a year had been frustrated largely by the failure of the agreement to produce a joint journal with the PSG. He had, however, solicited guest editorials for each issue which proved to be a popular feature, and recruited John Chardine to serve as book reviews Editor. The journal provided the forum for a controversial series of articles by Richard Snell and N. G. Smith which had strong ethical implications. Robert S. Baker became the new treasurer, Steven Patton the new secretary, and Lise Hanners filled the new position of membership secretary. The name *Newsletter* was officially changed to *Colonial Waterbird Society Bulletin* to reflect the reality that it is much more than simply a newsletter. P. A. Buckley became the chairman of the International Awards Committee. Michael Erwin, as the CWBS representative to the Ornithological Council (OC) agreed to keep the council informed as to the progress made in the formation of the OC.

The 1992 annual meeting, with President Keith Bildstein presiding, was held 14-18 October 1992, at the University of Mississippi, Oxford, hosted by James Kushlan. The meeting featured a full-day cormorant symposium, a riverboat cruise, and a field trip which included a visit to a catfish farm. Grants totaling $2300 helped to balance the meeting costs. Grants totaling $6000 were committed to the publication of the cormorant symposium, which was eventually printed as a special issue of *Colonial Waterbirds* (Nettleship and Duffy 1995). The council voted to establish a committee to examine the feasibility of the CWBS joining, and supporting financially, the Ornithological Council. The announcement of the establishment of two awards to be given by the CWBS was made in the May 1993 *Bulletin*. The Robert Cushman Murphy Prize highlights "either a lifetime of exceptional research, or a single extraordinary research accomplishment that resulted in a major redirection of study on waterbirds." The Kai Curry-Lindahl Award highlights either "a lifetime of singular efforts on behalf of conservation or management of colonially breeding waterbirds and their habitat, or to one outstanding example of such activity that has begun to serve as a model for future workers."

The 1993 CWBS meeting, with President Bildstein presiding, was a truly international meeting, with more than 50 North Americans joining nearly 300 waterbird biologists from more than 25 countries. The meeting was organized by the Station Biologique de la Tour du Valet, and held 6-10 October, in Arles, France. A grant of $6000 supported North American student travel to the meeting. A full-day Mediterranean symposium began the scientific sessions, and the symposium was published as a special issue of *Colonial Waterbirds* (Crivelli et al. 1996). Other symposium papers will be published in *Colonial Breeding in Waterbirds: Evolutionary Causes and Functional Consequences*, to be published by Oxford University Press. This was the largest meeting of the CWBS, with seven plenary lectures, four symposia, and 165 papers and posters (including over 30 student papers and posters). David Wingate received the first Kai Curry-Lindahl Award for his on-going work with the Bermuda Petrel (*Pterodroma cahow*) and restoration of native Bermuda ecosystems, and John Coulson received the first Robert Cushman Murphy Prize for his lifetime work on kittiwakes. Both received a $1000 cash award, and $1500 in travel money to give a lecture at a CWBS annual meeting, and each was expected to contribute a refereed paper to *Colonial Waterbirds*. It was announced at the council meeting that Peter Frederick had been elected secretary, and that Donald McCrimmon would replace *Colonial Waterbirds* Editor Michael Erwin beginning January 1994. The Membership Committee (Larry Bryan chair) report indicated that the CWBS brochure had been printed in French and German and should be printed in Spanish and Italian. It was noted that the French National Research Center had found that citation index rating for *Colonial Waterbirds* indicated that it was the fifth most important ornithological journal in Europe. The Ornithological Council Committee recommended that the Ornithological Council deserved the support of the CWBS, and that funding level for membership did not necessitate a dues increase. It was voted to limit the annual expenditure to $250, with the amount of the contribution to be discussed by council each year. A grant of $2000 from the CWBS to Latvian conservation, which had been approved by council by mail ballot, was to be made in the near future.

This important international meeting was the culmination of the growth of the CWBS into a truly international organization.

THE COLONIAL WATERBIRD SOCIETY BECOMES A MEMBER OF THE ORNITHOLOGICAL SOCIETIES OF NORTH AMERICA

The CWBS had established an international reputation and membership, and a journal in which usually more than half the papers and notes were from outside of North America (Fig. 12). The next logical step in the growth and maturation of the society was to seek membership in OSNA which included the most prominent North American ornithological associations, the American Ornithologists' Union, the Association of Field Ornithologists, the Cooper Ornithological Society, and the Wilson Ornithological Society. The characteristics which separated these four organizations from others in North America were their national and international scope, and their publication of major refereed journals. By these criteria, it seemed that the CWBS was qualified for membership.

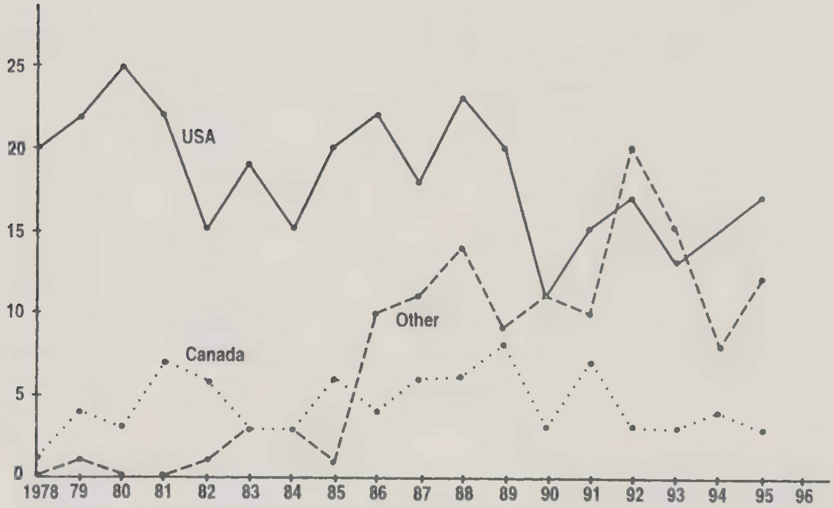

Fig. 12. Numbers of major papers and notes published in *Colonial Waterbirds* and *Proceedings* of annual meetings with senior author from USA, Canada, or other country.

The 1994 annual meeting, with President David Nettleship presiding, was held from 9-12 October 1994, at Wrightsville Beach, North Carolina. Vice-president Kushlan enumerated the advantages of becoming a member of OSNA, including centralized mailing and membership services, inclusion in *The Flock*, the broader audience in the *Ornithological Newsletter*, increased membership, and recognition of the CWBS as a premier scientific society in North America. A motion directing President Nettleship to assemble an application for CWBS membership in OSNA passed unanimously.

In additional business, Steven Kress announced his desire to step down as chair of the Conservation Committee and recommended reexamination of the Committee's structure and function. Later, President Nettleship, at the general business meeting, announced plans to reorganize the committee.

Editor McCrimmon received council approval to explore the benefits and costs of a shift in printer of *Colonial Waterbirds* to Allen Press in Lawrence, Kansas, which prints the journals of the four OSNA members. In the May 1995, issue of the *Bulletin*, President Nettleship announced that a formal proposal for membership had been submitted to OSNA in January.

The 1995 annual meeting, 8-12 November (Fig. 13), was the third joint meeting with the PSG and took place in Victoria, British Columbia, Canada. The highlight of the council meeting on 8 November was an address delivered by Fred Lohrer, Director of the Ornithological Societies of North America welcoming the CWBS into OSNA. President Nettleship's enthusiasm when describing the meeting in the December 1995, *Bulletin* is evident: "When Fred Lohrer, on behalf of the existing OSNA member organizations, congratulated and welcomed the Colonial Waterbird Society into OSNA partnership, it was evident as ever by the novel expression of all present that a new era for CWS had begun. Fred's warm welcome and comprehensive, yet succinct, introduction to the OSNA partnership were stimulating and exciting. At first, the review of business overwhelmed us with the realization that we were now an OSNA partner, an outstanding achievement in itself. But what became immediately apparent, was the privileged position we now occupied in North American ornithology and the responsibilities associated with that status. Doubtless, a type of metamorphosis had taken place, the transformation of a youthful, striving organization into a mature one, comfortable and confident with its role and aspirations in avian science and conservation. The formal signing of the OSNA Memorandum of Agreement by the two societies cemented what was already known, that future prospects were limited only by our collective imagination and creativity. This understanding of place and potential was the highlight of the Victoria conference for our Society."

The new directions for the CWBS were evident in the appointment of out-going President David Nettleship as chair of the Conservation Committee, and the appointment of Frank Cezilly of France as chair of the Membership Committee.

The twentieth anniversary, 1996 annual meeting, was held in Charleston, South Carolina—the site of the first and tenth annual meetings—October 16-20 (Figs. 14-15). President James Kushlan presided over the meeting at which 44 oral presentations and 43 posters were presented. James A. Hancock received the Kai-Curry Lindahl Award (Fig. 16), and J. P. Croxall received the Robert Cushman Murphy Prize. The Colonial Waterbird Society made its first Distinguished Service Awards to P. A.

Fig. 13. 1995 Council. From left to right: back row, Mauro Fasola, Peter Frederick, Ruth Beck, Joseph Jehl; middle row, Frank Cezilly, William Scharf, Bob Baker; front row, James Kushlan, David Nettleship, Robert Butler, Francine Buckley. Photo and caption courtesy of Joanna Burger and Michael Gochfeld.

Buckley, Joanna Burger, Betty Carnes, Michael Gochfeld, Herbert Kale II, Donald McCrimmon, Iola Price, and William Southern. Council created an endowment of $60,000, with the provision that interest accumulate until the fund reaches $100,000. Editor McCrimmon announced that the 1966 Editor's Award for the best paper in *Colonial Waterbirds* went to J. A. Fairweather and J. C. Coulson (1995), and that *Colonial Waterbirds* would be published three times a year beginning in 1997. The rejection rate of papers submitted to *Colonial Waterbirds* had reached upwards to 30%, a further indication of the journal's growing quality.

The twentieth anniversary meeting featured an informal symposium on the history of the Colonial Waterbird Society at the Wednesday evening reception, and a wading bird symposium that provided a retrospective and recapitulation of progress to the challenges identified in the 1976 North American Wading Bird Conference. These papers discussed advances in

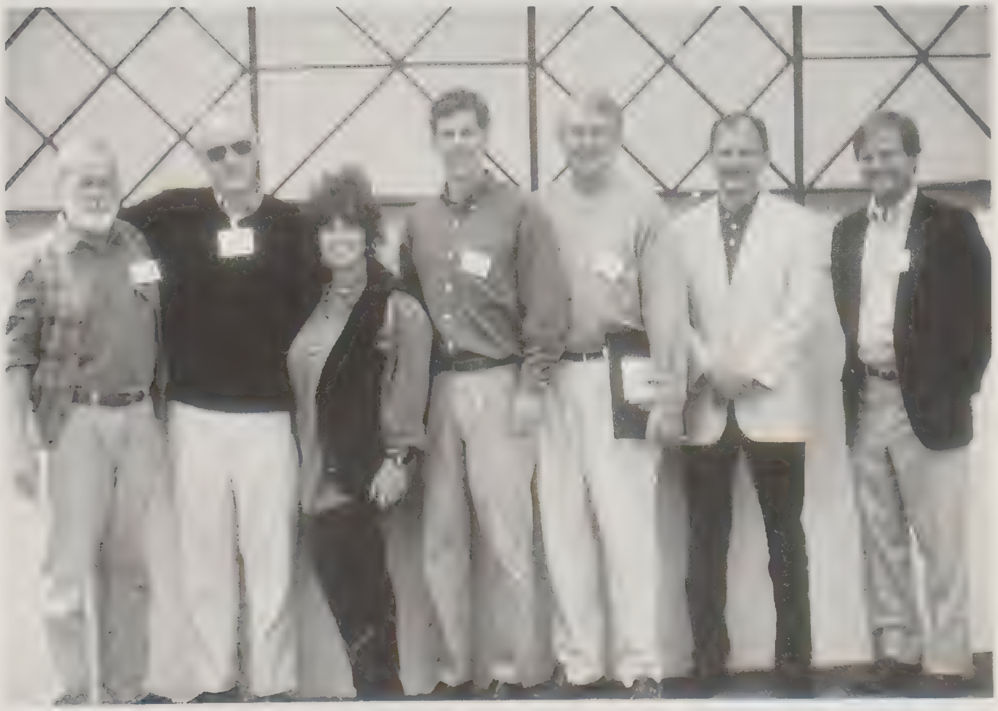

Fig. 14. Charleston, South Carolina, 1966. From left to right, past presidents: John Ogden, P. A. Buckley, Joanna Burger, Michael Erwin, Donald McCrimmon, Keith Bildstein, James Kushlan. Photo and caption courtesy of Joanna Burger and Michael Gochfeld.

Fig. 15. Charleston, South Carolina, 1966, Council. From right to left: back row, William Scharf, Ian Nisbet, James Kushlan, Francine Buckley, Ruth Beck, Ralph Morris, Donald McCrimmon, John Coulson; front row, Hans Hafner, Mauro Fasola, Peter Frederick. Photo and caption courtesy of Joanna Burger and Michael Gochfeld.

ciconiiform systematics in the past 20 years (Sheldon and Slikas 1997), wading bird ecology (Hafner 1997), demographic studies of wading birds (Cezilly 1997), conservation (Kushlan 1997), and thoughts on the future of wading-bird science (Bildstein 1997).

A RETROSPECTIVE: THE FIRST TWENTY YEARS

The CWBS had come a long way in the relatively brief span of 20 years since the organizational meeting in 1976 at the Wading Bird Conference. It had achieved organizational stability in membership and finances, developed an international journal, *Colonial Waterbirds*, an international membership, and a *Bulletin* which does an excellent job of enhancing communication among members. It had become a member of OSNA.

On the other hand, in the opinion of its first President, John Ogden, although it had met some of the original goals established in the genesis days, it had failed to achieve a satisfactory level of success in others: "We have done very well at communicating on current research, and on producing a good bulletin. We have played only an inconsistent role in almost all management and conservation issues, such as standardization of census protocols, and the application of our understanding of the organisms we study, for the protection of these species and their habitats, especially at any global, national, or large regional scales. On these issues, I suggest that we have been no more effective than have been any of the other major

Fig. 16. Charleston, South Carolina, 1996. Left to right: James Hancock and James Kushlan. Photo and caption courtesy of Joanna Burger and Michael Gochfeld.

ornithological societies of North America. We have become, like them, a scientific society, without great success at bridging the dichotomous tracks of science and conservation" (J. Ogden, pers. comm.) Although this summation may appear harsh, and despite the existence of an active Conservation Committee throughout most of the organization's history, it may be that in conservation issues the organization has taken more the route of *ad hoc* response to specific issues rather than taking global initiative.

The CWBS has always maintained an egalitarian posture—without head tables at the meetings, an open invitation to any member to sit in on the council meetings, and with most fundamental issues put to the vote of the general membership. It has also featured a strong emphasis on providing students with opportunities for attendance, participation at annual meetings, and for publication of their work. In this regard, the words of Ralph Morris may make a fitting end to this retrospective. "The annual meeting of the Colonial Waterbird Society is the only annual Society meeting that I always take my students to. . . . This is the place where most of them have presented their very first professional paper in public. This is the one where each of them knows members of the audience will be informed about the science, and where virtually all those attending the meeting will be in the audience to hear their presentation (our tradition of not having concurrent sessions is a valuable one). This is the only one where the comments will be friendly (but pointed). This is the one where the questioner and all others in the audience are available for private discussions over the remainder of the meeting. For students of all ages and experiences (including us 'life-long learners'), these are worthy reasons to attend.

Finally, I meet (again) many of my best professional friends at the annual meeting of this Society. While I never count on seeing them elsewhere, I do at the CWBS meeting and the disappointment is real when [they are] absent."

ACKNOWLEDGMENTS

I thank Robert Baker, P. A. Buckley, Francine G. Buckley, Joanna Burger, Michael Erwin, James Kushlan, Ralph Morris, John Ogden, and Iola Price who supplied me with detailed written accounts of personal recollections of their respective roles in the CWBS (I referenced these comments in the text as personal communications). I thank Keith Bildstein, Francine G. Buckley, P. A. Buckley, Joanna Burger, Thomas Custer, Michael Erwin, Michael Gochfeld, James Kushlan, Donald McCrimmon, Ralph Morris, David Nettleship, Ian Nisbet, John Ogden, Iola Price, and William Southern for critically reviewing various drafts of the manuscript. I thank James Kushlan for prodding me into this venture, and sending out the questionnaire to which many responded. Roger Clapp is largely responsible for the "paper trail" at the Smithsonian Archives, which greatly facilitated my study. Special thanks go to all the secretaries of the CWBS whose minutes of council and business meetings provided the heart of the information base about the Society. The *Newsletter/Bulletin* in which the president's reports and all the minutes were published has been my primary source of information. Special thanks go to Joanna Burger and Michael Gochfeld whose faithful attendance at Colonial Waterbird Society meetings and photographic talents have produced a marvelous photographic history of the Society. They provided the photographs and captions published in this account.

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Table 1. Elected Officers, Councilors, and Editors.

President		
John Ogden	1978	1979
P. A. Buckley	1980	1981
Joanna Burger	1982	1983
Michael Erwin	1984	1985
William Southern	1986	1987
Donald McCrimmon	1988	1989
Herbert Kale II	1990	1991
Keith Bildstein	1992	1993
David Nettleship	1994	1995
James Kushlan	1996	-
Vice-president		
P. A. Buckley	1978	1979
Joanna Burger	1980	1981
Michael Erwin	1982	1983
William Southern	1984	1985
Donald A. McCrimmon	1986	1987
Herbert Kale II	1988	1989
Keith Bildstein	1990	1991
David Nettleship	1992	1993
James Kushlan	1994	1995
Ian C. T. Nisbet	1996	-
Secretary		
Joanna Burger	1978	1979
Michael Erwin	1980	1981
Francine G. Buckley	1982	1983
Donald A, McCrimmon	1984	1985
Brian Chapman	1986	1989
Steven Patton	1990	1993
Peter C. Frederick	1994	-
Treasurer		
Donald A. McCrimmon	1978	1981
Iola Price	1982	1989
Linda Kinkel	1990	1991
Robert S. Baker	1992	1995
Larry Bryan	1996	-

Newsletter/Bulletin Editor

Mitchell Byrd	1978	1979
Brian Chapman	1980	1981
William E. Davis, Jr.	1982	1987
Francine G. Buckley	1988	-

Editor: *Proceedings* 1978-1980, *Colonial Waterbirds* 1981-

William Southern	1978	1980
Herbert Kale	1981	1985
James Kushlan	1986	1988
Ralph Morris	1989	1991
Michael Erwin	1992	1993
Donald A. McCrimmon	1994	-

Council

Michael Gochfeld	1978	1978
Ronald Ryder	1978	1978
Spencer Sealy	1978	1978
Francine G. Buckley	1978	1979
Michael Erwin	1978	1979
Helen Hays	1978	1979
Helen Pratt	1978	1979
Herbert Kale II	1978	1980
William Southern	1978	1980
Iola Price	1979	1981
Douglas Slack	1979	1981
John Wiese	1979	1981
John P. Ryder	1980	1980
Mary LeCroy	1980	1982
Douglas Mock	1980	1982
Alexander Sprunt, IV	1980	1982
Michael Gochfeld	1981	1983
Kirke A. King	1981	1983
John P. Ryder	1981	1983
James A. Kushlan	1982	1984
D. V. Weseloh	1982	1984
David R. Blankinship	1982	1984
Brian R. Chapman	1983	1985
Roger M. Evans	1983	1985
Ralph Morris	1983	1985
Thomas W. Custer	1984	1986

Julian Dusi	1984	1986
Richard Paul	1984	1986
Keith Bildstein	1985	1987
Roger Clapp	1985	1987
Martin McNicholl	1985	1987
Hans Blokpoel	1986	1988
Jeremy Hatch	1986	1988
Kees Vermeer	1986	1988
Malcolm C. Coulter	1987	1989
Herbert W. Kale II	1987	1989
James A. Rodgers	1987	1989
Lise Hanners	1988	1990
R. Douglas Slack	1988	1990
Jeffrey A. Spendelow	1988	1990
Ed Brucker	1989	1991
Francesca Cuthbert	1989	1991
David Nettleship	1989	1991
Heinz Hafner	1990	1992
Ian C. T. Nisbet	1990	1992
Katherine Parsons	1990	1992
John Chardine	1991	1993
Steven Kress	1991	1993
Sheila Mahoney	1991	1993
William E. Davis, Jr.	1992	1994
David Duffy	1992	1994
Judy Pierce	1992	1994
Robert Butler	1993	1995
Frank Cezilly	1993	1995
Eileen Kirsch	1993	1995
Joseph Jehl, Jr.	1994	1996
William Scharf	1994	1996
Gaston Tessier	1994	1996
Mauro Fasola	1995	1997
David Schneider	1995	1997
Betty Anne Schreiber	1995	1997
Ruth Beck	1996	-
John Coulson	1996	
Ralph Morris	1996	-
Patricia Baird	1997	
Xavier Ruiz	1997	-
Emil Urban	1997	-

10

A Century of Ornithology in Nebraska: A Personal View

Paul A. Johnsgard [1]

ABSTRACT.—The Nebraska Ornithologists' Union celebrated its centennial year during 1999. During more than 65 years it has published a quarterly journal, the *Nebraska Bird Review*, and has also published several proceedings of annual meetings as well as special or "occasional" publications. During this same century one native Nebraska bird species (Passenger Pigeon) has become extinct, another (Eskimo Curlew) has possibly become extinct, and at least 15 species apparently have been extirpated as breeding species in the state. Additionally at least seven species have begun breeding successfully in the state, either through purposeful or accidental human efforts, or by range expansion and associated self-introduction. Several species have also managed to re-establish themselves after near extirpation or severe population decline.

An attempt to summarize the history of a century of ornithology by a person who has witnessed only the last forty years of it, is perhaps as difficult as it is to describe an elephant when only its retreating rear end has been seen. Misinterpretation as well as an emphasis on the better-known and closer portions are likely to occur. Furthermore, besides being a necessarily myopic view, the following account has a distinctly personal touch, inasmuch as I have seen Nebraska only through my own eyes and experiences. Yet, we have good documentation of the activities of ornithologists at the turn of the last century through the earliest publications of the Nebraska Ornithologists' Union, and these have helped to let me see the front of the elephant with some clarity. I hope others might agree.

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The history of scientific ornithology in the state began with the Lewis and Clark expedition, when the group passed northward through what is now Nebraska in July of 1804. About 25 species were observed by them at that time (Swenk 1935). Two decades later, a government expedition headed by Major S. H. Long passed through Nebraska in 1819-1820, and included the naturalist Thomas Say. They spent the winter near the present location of Council Bluffs, and observed a substantial number of species (Thwaites 1905). The Orange-crowned Warbler (*Vermivora celata*) was discovered near Council Bluffs (perhaps on the Nebraska side) during this expedition. Still later, Prince Maximilian, together with his artist Karl Bodmer, passed upstream through Nebraska's section of the Missouri in April and early May of 1833, and downstream again in May of 1834. At that time such species as the Whip-poor-will (*Caprimulgus vociferus*) and Wood Duck (*Aix sponsa*) were heard or observed commonly. A decade later, in the spring of 1843, J. J. Audubon traveled up the Missouri River with two friends, Edward Harris and John Bell. They returned that fall, in September and early October. During that trip the Western Meadowlark (*Sturnella neglecta*) was first discovered (in what is now North Dakota), as were the Harris' Sparrow (*Zonotrichia querula*) and the Bell's Vireo (*Vireo bellii*), both in what is now Missouri. Nesting of the Bald Eagle (*Haliaeetus leucocephalus*) was seen near the mouth of the Platte River, and both Canada Geese (*Branta canadensis*) and Great Blue Herons (*Ardea herodias*) were found nesting along the Missouri in what is now Nebraska. In 1833 the Lark Bunting (*Calamospiza melanocorys*) and Chestnut collared Longspur (*Calcarius lapponicus*) were discovered along the Platte River in what is now western Nebraska, by the Philadelphia naturalist John K. Townsend and Thomas Nuttall, on their expedition to the Columbia River, as recounted in Townsend's *Narrative of a Journey Across the Rocky Mountains.*

THE FORMATION AND HISTORY OF THE NEBRASKA ORNITHOLOGISTS' UNION

In 1894 Isadore S. Trostler of Omaha sent out a notice, asking that all persons interested in Nebraska ornithology and oology might submit their names and addresses to him. From this effort he received about ten replies. He tried to arrange a meeting with these persons with a view to forming a state organization devoted to birds, but failed. He tried again in 1895 and 1896, and failed both years. Again in 1898 he tried to organize a meeting in conjunction with the Trans-Mississippi Exposition, but only managed to visit with a few of his now nearly 25 contacts when they visited the exposition. Finally, in May, 1899, he arranged a preliminary organizational meeting with five others. These people were mostly from the Omaha area, but also included M. A. Carriker, Jr. of Nebraska City. They decided their group should be called the Nebraska Ornithologists' Association. They soon learned that only about three months previously, Robert H. Wolcott and Lawrence Bruner, both well-known biologists of the University of Nebraska, had organized a Nebraska Ornithological Club in Lincoln. The Omaha group thus petitioned the Lincoln group to open their membership to the entire state. As a result, in May of 1899 a committee of the Lincoln club sent out letters around the state, inviting interested persons to join their group. On 15 July 1899, the first meeting was held for the election of officers, with 43 persons attending. The first annual meeting finally occurred in Lincoln, on 16 Dec. 1899. At that time the constitution of the Nebraska Ornithologists' Union was ratified, with more than 90 active and associate charter members.

The first president of the NOU was Lawrence Bruner, with I. S. Trostler serving as vice-president. The first annual meeting included nine paper presentations. One by J. S. Hunter provided a list of birds seen at the "salt basin" lake west of Lincoln (now Capital Beach), consisting of 85 species (then-current taxonomy) of waterbirds and shorebirds, including such unexpected species as the Whooping (*Grus americana*) and Sandhill (*Grus canadensis*) cranes. Another, by M. A Carriker, Jr., described the nesting of ten species of raptors in Otoe County, at least three of which no longer nest in southeastern Nebraska.

The second annual meeting was held in Omaha, on 12 January 1901, with I. S. Trostler now president, and with 64 active members as well as 36 associates and four honorary members. Included in the charter membership rolls were such outstanding scientific luminaries from the University of Nebraska as E. H. Barbour, Professor of Geology and internationally known paleontologist; Frederick. E. Clements, Professor of Botany and one of the pioneers of American plant ecology; Lawrence Bruner, Professor of Entomology and also already an authority on Nebraska's birds; and Henry B. Ward, Professor of Zoology and nationally-known parasitologist and invertebrate zoologist. Unlike some ornithological groups of the time, there were no restrictions on membership by sex, and there were at least nine women who were full members by 1901 (including the group's vice president), as well as 12 female associate members.

Among 21 papers presented at the second annual meeting, Lawrence Bruner summarized information on the bird species known to be nesting in Nebraska, which totaled 185 species. Another 39 species were listed as

Fig. 1. Lawrence Bruner. Courtesy of the NOU Library and Archives.

undoubtedly breeding, but evidence was lacking. Many of the species listed as then "known" to nest in the state, such as both yellowlegs (*Tringa flavipes* and *T. melanoleuca*), are now known not to be breeders. M. A. Carriker, Jr., later to become famous as a collector of tropical birds in Central and South America for several major museums, also presented two papers.

The third annual meeting was held in Lincoln, in February of 1902, with Erwin Barbour presiding. He presented a long and excellent paper on the probable reptilian ancestry of birds, based on the fossil record (Barbour 1903). He included several fine reconstructions of *Archaeopteryx* and a phyletic diagram suggesting that theropod dinosaurs provided the ancestral origin of birds. Robert Wolcott offered an historical review of ornithology in Nebraska, mainly comprised of an extensive bibliography. Lawrence Bruner described the birds of the eastern Sandhills, and Myron Swenk offered a paper on wintering birds of Nebraska. An excellent paper on the distributional affinities of Nebraska's birds was presented by Robert Wolcott at the fourth meeting, who judged that by then six species, the Lesser Prairie-chicken (*Tympanuchus pallidocinctus*), Wild Turkey (*Meleagris gallopavo*), Passenger Pigeon (*Ectopistes migratorius*), Carolina Parakeet (*Conuropsis carolinensis*), Northern Raven (*Corvus corax*) and Chihuahuan Raven (*C. cryptoleucus*) were already extinct or extirpated from Nebraska.

Myron Swenk, a charter member while still a high school student, was subsequently destined to follow Bruner as a University of Nebraska Professor of Entomology and spiritual leader of the NOU for many decades. John T. Zimmer was only ten years old when the NOU was formed, but later, while at the University of Nebraska, he too came under the influence of Bruner, and went on to become one of Nebraska's most famous ornithologists, winning the AOU's Brewster medal in 1952. Working at both the Field Museum and the American Museum of Natural History, he authored a valuable bibliography of the Field Museum's ornithological library (Zimmer 1926), and was a contributing author to the monumental *Catalogue of the Birds of the Americas* and also to J. L. Peters' *Check-list of the Birds of the World*.

The triad of Bruner, Wolcott, and Swenk published "A Preliminary Review of the Birds of Nebraska" (1904), complete with identification keys and documentation of occurrence for every species then reported from the state. Earlier (1896), Lawrence Bruner had published the first complete checklist of Nebraska birds, totaling (again, in the taxonomy of the day), some 415 forms (species and subspecies), and 225 breeding forms. Viewed in terms of modern taxonomy, the list included some 350 species.

During the early years of the NOU, the *Proceedings* were produced annually through 1902. From 1908 to 1915 the annual meeting's proceedings were also published (as three additional volumes), but there was still no journal for the NOU. By the 16th annual meeting in 1915, financial or other considerations had seemingly made it impractical to continue publishing the NOU's annual proceedings, and their publication was terminated. Instead, the NOU decided to become an auxiliary of the Wilson

Fig. 2. Robert H. Wolcott. Courtesy of the NOU Library and Archives.

Ornithological Club (WOC), with shared membership dues. The Wilson Ornithological Club had been formed in 1886, but did not begin holding annual meetings until 1914. This arrangement of affiliation with the WOC lasted through 1924, and during that period brief summaries of the NOU meetings were published annually in *The Wilson Bulletin*. Starting in 1925, a mimeographed *Letter of Information* was periodically mailed to members, with 68 issues written by the end of 1932, most or all being written

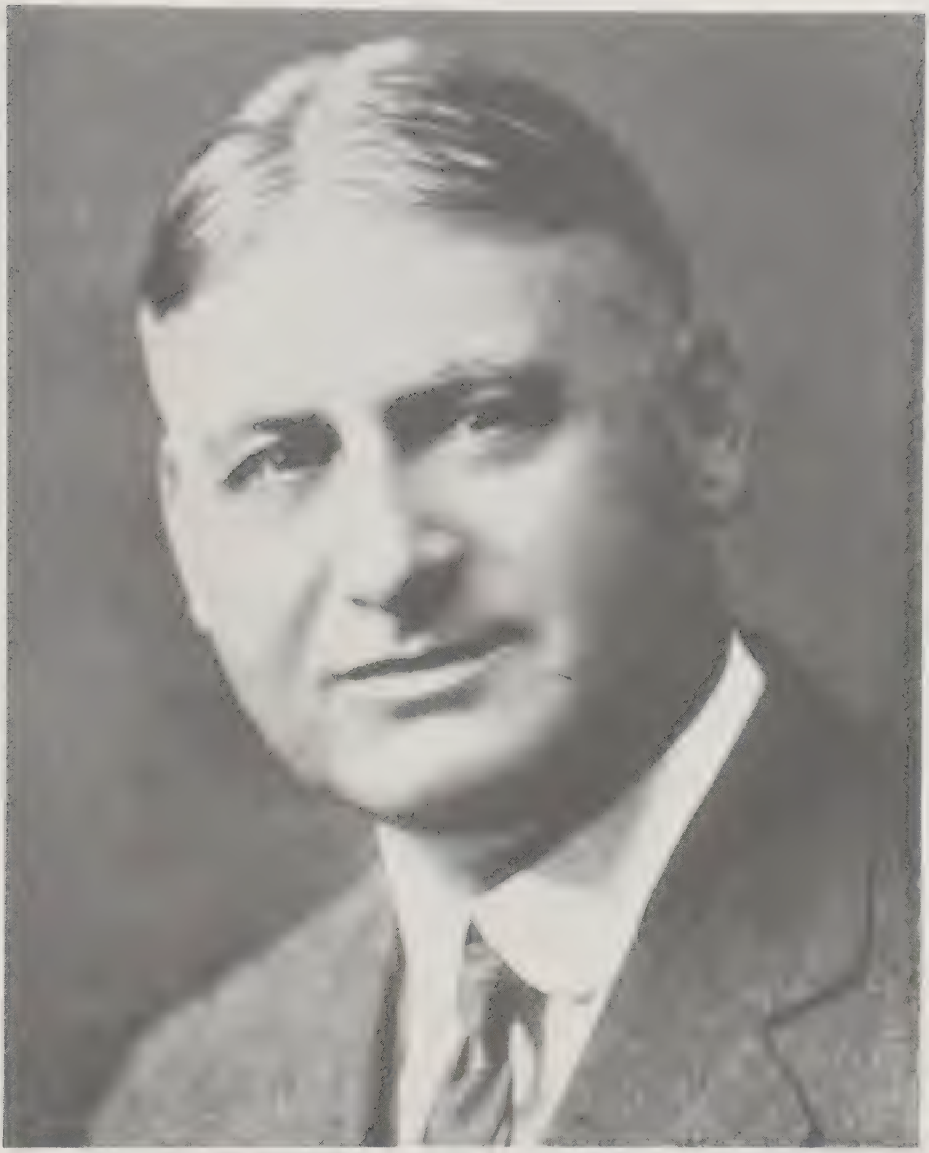


Fig. 3. Myron H. Swenk. Courtesy of the NOU Library and Archives.

by Myron Swenk. Apparently only a few intact sets of these still exist, two of which are in the files of the NOU library at the State Museum of the University of Nebraska and in the Special Collections of the University of Nebraska archives in Love Library.

The official journal of the NOU, *The Nebraska Bird Review*, began publication with the January 1933 issue. On its cover was a drawing of a Burrowing Owl (*Athene cunicularia*) by John L. Ridgway, brother of

Robert Ridgway. The choice of this species as a logo seemed appropriate, since the type specimen of the North American subspecies had been collected near the Platte River of Nebraska during the Long Expedition in 1820. Myron Swenk was editor, and a list of the prior publications of the NOU was included with the first issue. These consisted of six volumes of the *Proceedings* of the NOU annual meetings from 1900-1915, a field checklist of Nebraska birds (dated 1908), the nine years of annual meeting proceedings that had been published in *The Wilson Bulletin* (1916-1924), and the *Letter of Information* series (1925-1932).

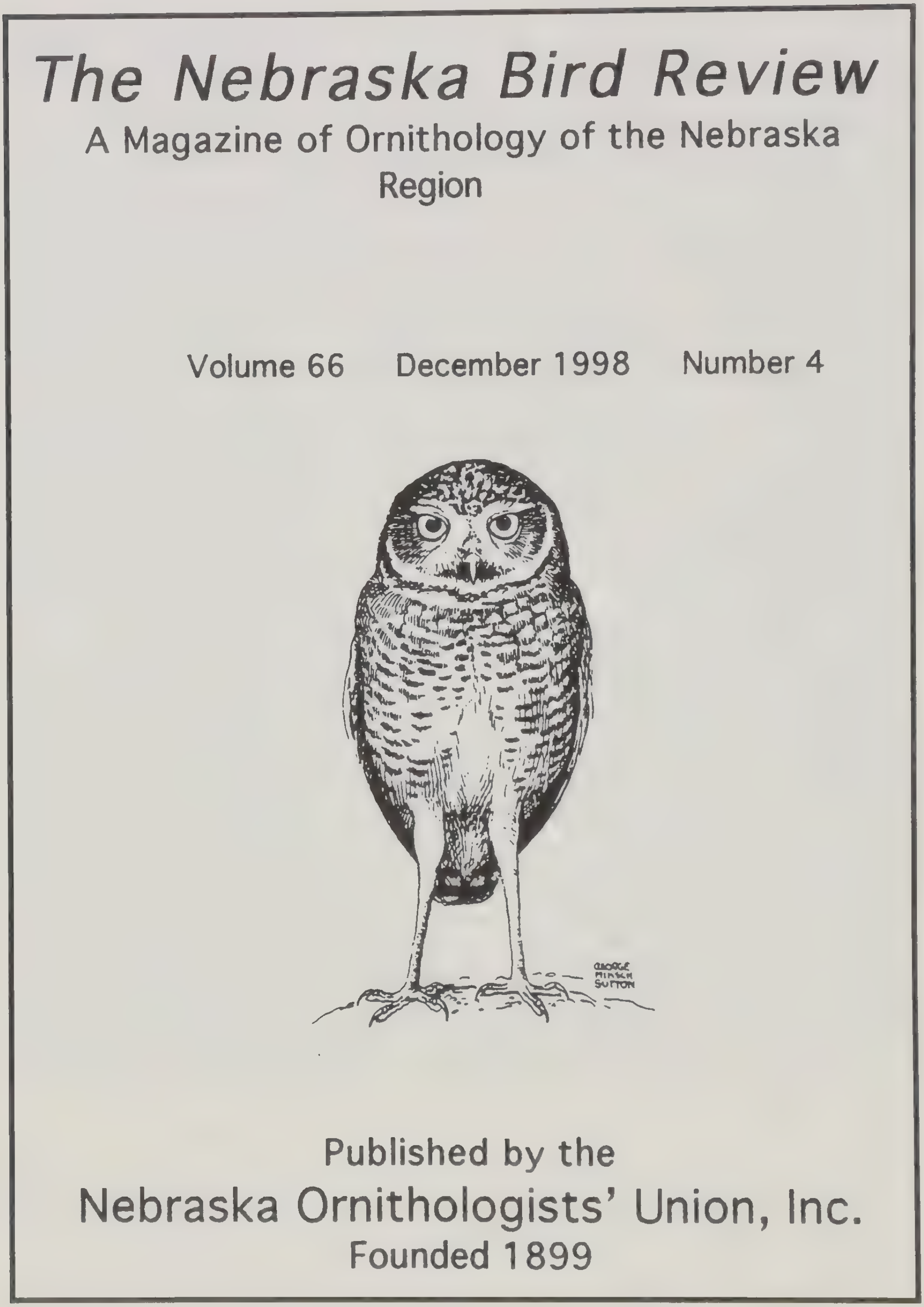
By the late 1930s, there were more than 120 active members of the NOU, with three charter members (A. L. Haeker, M. H. Swenk, and Wilson Tout) still active. Since 1925, annual summaries of spring and fall bird migration records have been published, first in the *Letter of Information* series and later in the *Review,* providing an extremely valuable and long-term record of seasonal changes in Nebraska bird populations. With the start of the 1938 volume a new cover sketch, by George Miksch Sutton, was introduced. Sutton had been born in the Bethany area of Lincoln, but the family left while he was still a child. This fine drawing (Fig. 5) has served as a logo for the NOU ever since, except for a brief period when a sketch by the then-editor, Henry Baumgarten, was used.

In 1941 Myron Swenk died, after having served the NOU long and well. Not only had he served as its president (1907-1908), but also as secretary or secretary-treasurer from 1904 to 1937, as the editor of the *Proceedings* for many years, as writer of the *Letters of Information*, and as editor of the *Nebraska Bird Review* from its beginnings throughout the 1930s. He also served as president of the Wilson Ornithological Club in 1918-1919. He published over 70 ornithological papers in his career, plus many others in entomology and mammalogy. His collection of several thousand bird and mammal specimens, and an insect collection, with more than 142 type specimens, was given to the University after his death. The first issue of the 1942 volume was a special memorial issue devoted to Swenk and his lifelong devotion to the NOU.

Through 1942 annual meetings had been held in many cities of the state, with Lincoln serving as host most often (17 times), followed by Omaha (10 times). By then there were some 140 NOU members, and there were active bird (or nature) clubs in Lincoln, Omaha, North Platte, Superior, Hastings, Fairbury, and Chadron. The NOU also became an Affiliated Society of the Nebraska Academy of Science, and for a few years had a separate papers session during that group's annual meeting. For a time there was also a mid-winter NOU meeting, for the purpose of presenting papers.

Fig. 4. Wilson Tout. Courtesy of the NOU Library and Archives.

An annotated check-list of the birds of Nebraska was produced by the NOU, and was published in the *Review* (Haecker et al. 1945). A revised version of this list was later produced (Rapp et al. 1958). The latter list included four hypothetical species plus 393 accepted species, of which 218 were judged to be breeders. It was reprinted unchanged, but with a short supplement by R. ("Rusty") G. Cortelyou and Kent L. Fiala, in 1970. Cortelyou served as a long-term editor of the *Review*, from 1965 to 1990.



The Nebraska Bird Review

A Magazine of Ornithology of the Nebraska Region

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Fig. 5. Drawing of a Burrowing Owl by George Miksch Sutton that has served as the NOU logo and cover illustration for *The Nebraska Bird Review* nearly continuously since 1938. Courtesy of the NOU Library and Archives.

and Kent Fiala also produced (1970) a checklist of the birds of Gage County while still an undergraduate student at the University of Nebraska.

The NOU suffered constant financial problems during the 1930s and 1940s, and there is indirect evidence that Myron Swenk personally helped keep the organization financially afloat during the Depression. Even when William Rapp took over the editorship of the *Review* in 1949, he found that the local printer was unwilling to undertake the printing of his first issue until a payment of five hundred dollars in back payments was made. This amount was personally covered by the then NOU president, Allyn Moser.

PERSONAL REFLECTIONS

The mid-1950s was a time of great interest in Platte Valley birds by nationally known ornithologists. Charles Sibley of Cornell University led his students (especially Lester Short. Jr., and David West) on a series of summer collecting expeditions to central Nebraska, studying breeding biology and collecting specimens of several east-west species-pairs of birds that hybridize extensively in that valley. These studies (Sibley and Short 1959, 1964; Sibley and West 1959; West 1962; Short 1965) proved the importance of the Platte Valley, and to a lesser extent the Niobrara Valley, as dispersal corridors and major evolutionary "suture zones" between eastern and western avifaunas. Their findings spurred a revision in our taxonomic interpretations of such hybridizing birds as the Yellow-shafted (*Colaptes auratus*) and Red-shafted (*C. cafer*) flickers (= Northern Flicker), the Eastern (*Pipilo erythropthalmus*) and Spotted (*P. maculatus*) towhees (= Rufous-sided Towhee), the Baltimore (*Icterus galbula*) and Bullock's (*I. bullockii*) orioles (= Northern Oriole), and several others. Later work out of the University of Kansas on the orioles by J. Rising (1973, 1983), and on the Great Plains meadowlarks by S. A. Rohwer (1971, 1973) provided additional evidence for the importance of the Great Plains river valleys as major zones of genetic interactions among closely related birds.

During 1956-59 I attended at Cornell as a doctoral graduate student under Sibley, and listened in awe to the stories my graduate student friends told me of the beauty of Nebraska's Platte Valley in spring, and of its wonderful bird life. Little wonder that, when I learned of a job opening for an ornithologist at the University of Nebraska during 1961 while doing postdoctoral study in England, I wasted no time in applying for the position. I had never set foot in Nebraska at that time, but was certain that I would love the state. I also knew that Nebraska's Sandhills were a major waterfowl breeding region, but was unaware of another great ornithological

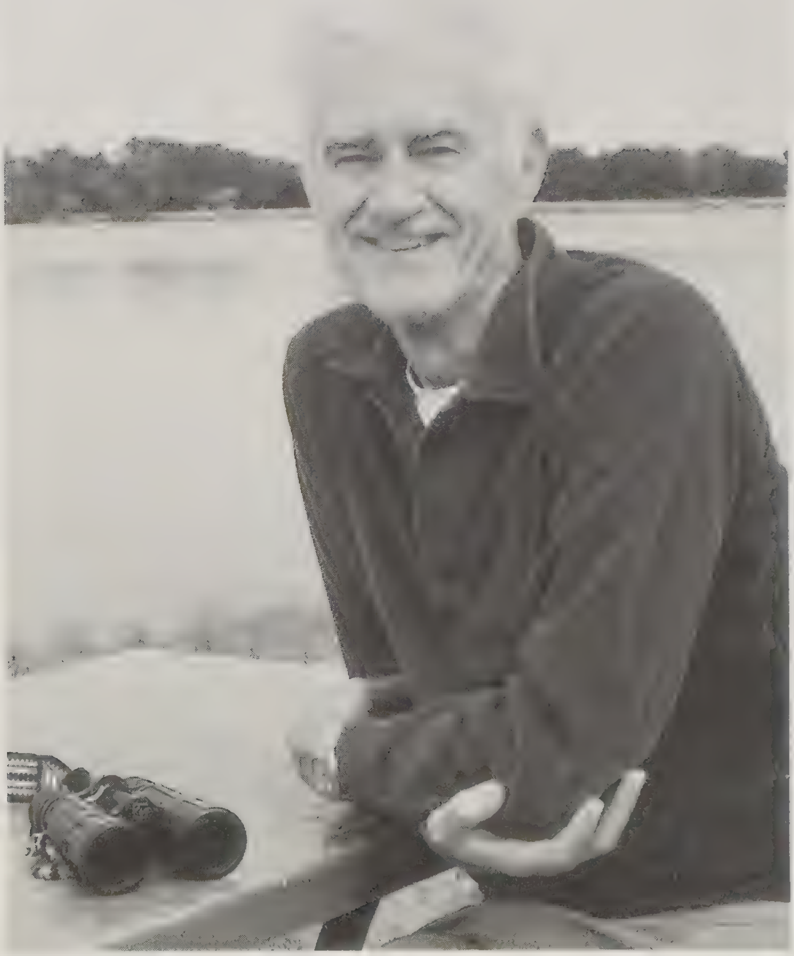


Fig. 6. Paul A. Johnsgard, September 1999. Photo by Linda Brown.

attraction of Nebraska, its amazing Sandhill Crane migration. I moved to Lincoln in the fall of 1961, and soon joined the NOU. However, my early interests during that period primarily concerned the biology and behavior of world bird groups, especially waterfowl.

I first attended and spoke at a NOU meeting in 1963, when I met some of the state's most active bird-enthusiasts, such as Doris Gates of Chadron, and Mr. and Mrs. John Lueschen of Wisner. Doris Gates was then editor of the *Review*, and served as such from 1955 to 1965, when Rusty Cortelyou assumed that role. Some others who served long periods as editor of the

Review included William F. Rapp, Jr., serving from 1948 to 1955, and Rosalind Morris, editor from 1992 to 1998. Neva Pruess served as librarian from 1979-1988. Mary Lou Pritchard has served the NOU in various capacities, most recently as librarian and custodian of NOU papers and records. Ruth C. Green has served the NOU in several roles over the years including the presidency (1979-1981, 1982-1984), and has inspired a whole generation of bird-banders and bird-enthusiasts. An interesting account of early bird-banding activities in Nebraska was provided by H. Weakly in the July-December, 1939, issue of the *Review*.

After the death of Willetta ("Willie") Lueschen, who had also been an active bird-bander, as well as president and membership secretary of the Inland Bird Banding Association, her husband John donated her extensive ornithology library to the City of Norfolk, and it became a special wing of the Elkhorn Valley Historical Museum (The Willetta Lueschen Library) in 1997. The NOU library is now located with the vertebrate collections at the State Museum at Lincoln, and includes some rare items, including early correspondence, many specialized monographs, more than forty state or regional journals and several hundred books. I used it extensively during my research on the breeding birds of the Great Plains, as it contains many state journals not otherwise available in Lincoln. It has recently (1998) been computer-inventoried and documented by Neal Ratzlaff and Mary Lou Pritchard.

I perhaps paid too little attention to the birds of Nebraska until I began work on my *Breeding Birds of the Great Plains* in the late 1970s. At that time I decided that a new checklist of the birds of Nebraska was badly needed, so I wrote "A Preliminary List of the Birds of Nebraska and Adjacent Plains States" (1980a), and produced a revised account later that year. This list was initially published as No. 6 in the series titled "Occasional Papers of the Nebraska Ornithologists' Union." I also published an annotated list of the breeding birds of Nebraska in the *Nebraska Bird Review* (1979), and a two-part paper on migration schedules of Nebraska non-passerine and passerine birds (1980b,c).

The last 20 or so years of the NOU membership have been marked by a greatly increased number of "hard-core" birders. Their enthusiasm has resulted in the addition of many new rare or accidental species to the Nebraska bird list, which now totals more than 430 species. The NOU Records Committee was formed in 1986, and an "Official List of Nebraska's birds" now exists, with periodic updates in the *Nebraska Bird Review*.

A newsletter to NOU members was begun in 1979, and by 1998 the membership list had reached about 230 active members. There are now many more professional ornithologists on the scene than when I first arrived, mostly working for state and federal agencies such as the Fish and

Fig. 7. Doris Gates. Courtesy of the NOU Library and Archives.

Wildlife Service, Nebraska Game and Parks Commission, public and private universities and colleges, the National Audubon Society, the Nature Conservancy and various municipal or private nature centers. A Nebraska Breeding Bird Survey that was organized by the NOU in the 1980s has recently been completed and is being edited for publication through the Nebraska Game and Parks Commission by Wayne J. Mollhoff. Half-century sequences of Christmas Bird Counts have been attained for Lincoln, Scottsbluff, and Omaha, and there are also fairly long, albeit interrupted, sequences for Grand Island, Sioux City, Norfolk, and Crete.

Fig. 8. Left to right: Rusty Cortelyou, Mary Lou Prichard, and Thomas Labedz. Photo by Linda Brown.

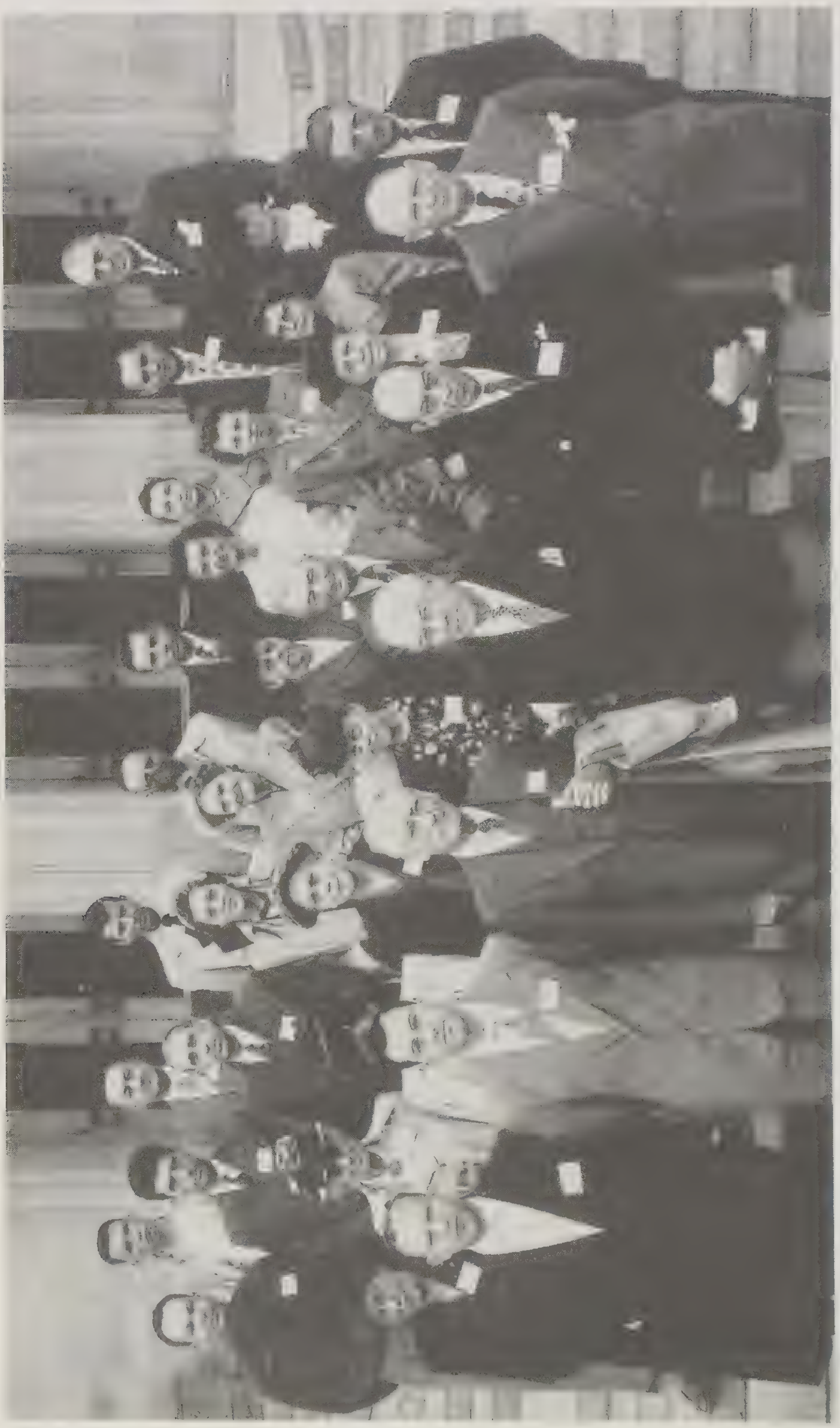
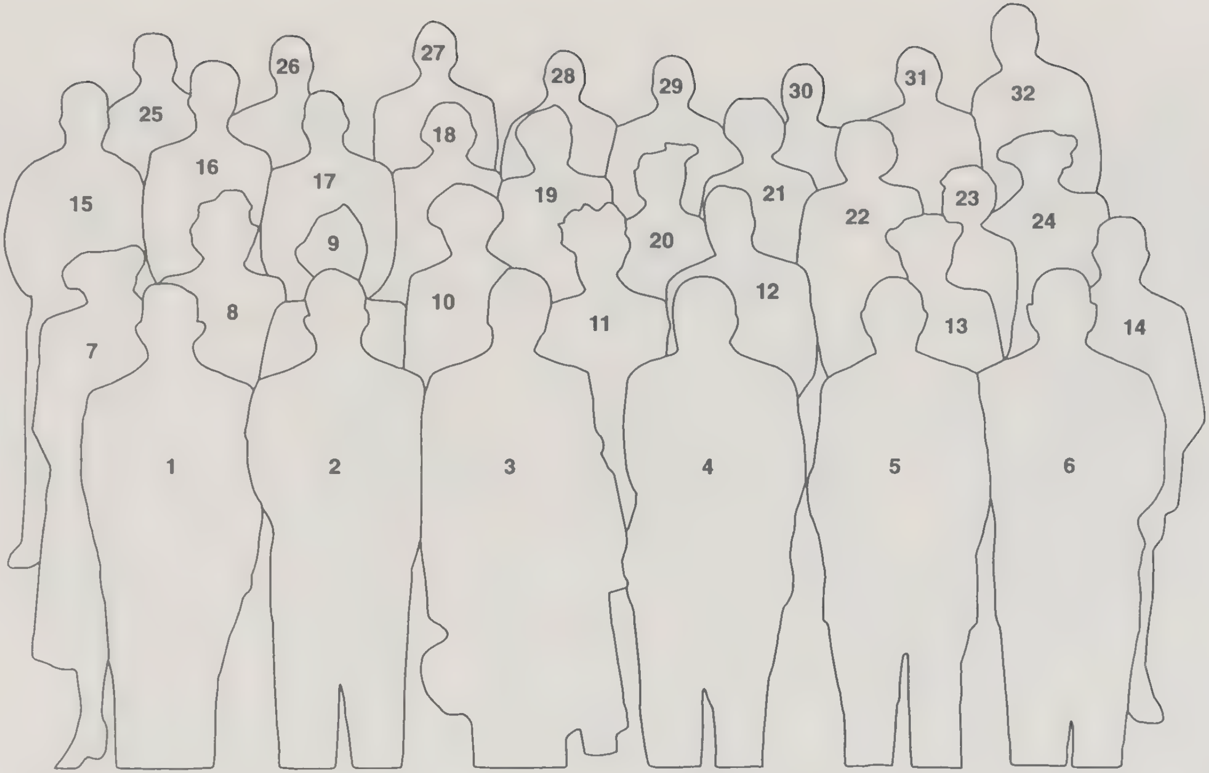
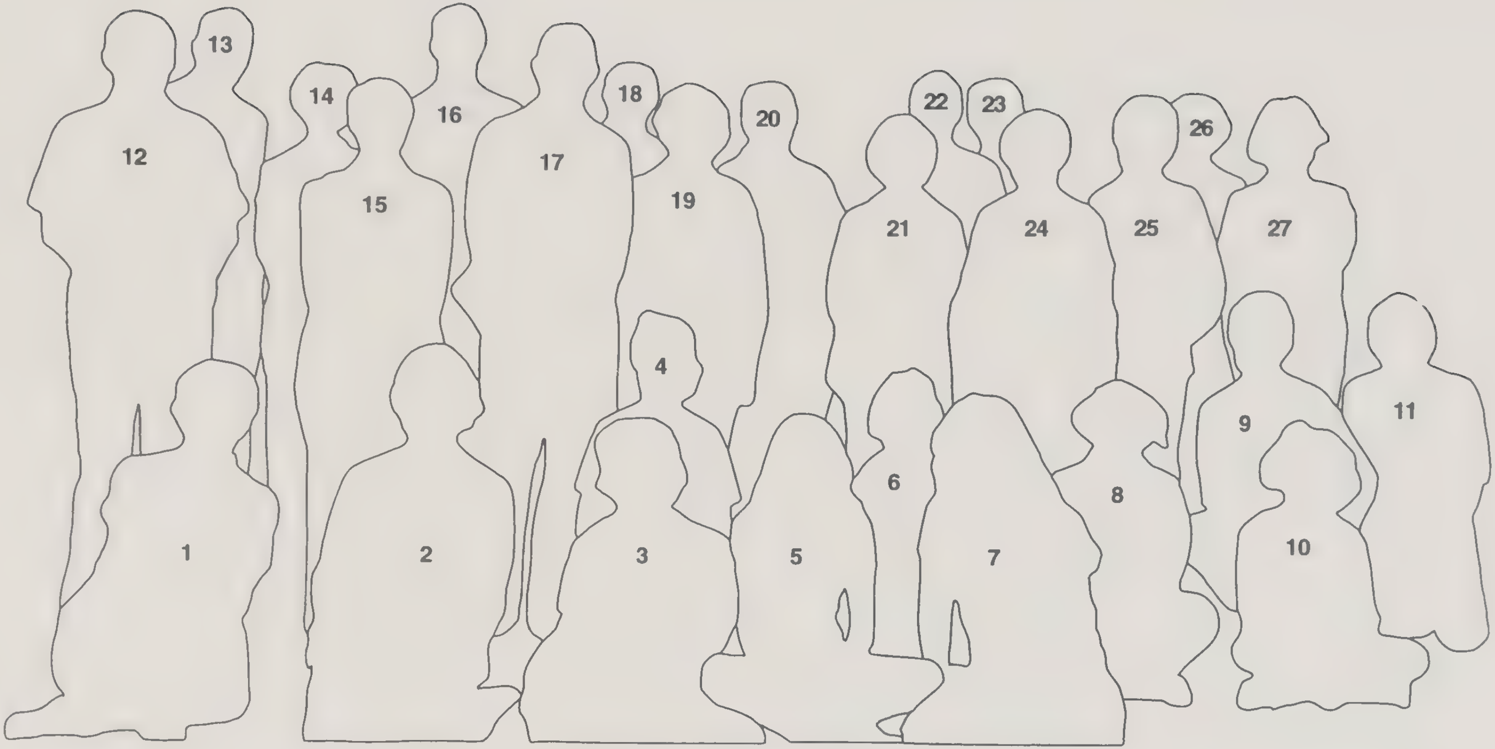


Fig. 9. Golden anniversary meeting of the Nebraska Ornithologists' Union, Lincoln, Nebraska, 6 May 1949. Courtesy of the NOU Library and Archives.



1. William Rapp
2.
3. Wilson Tout
4.
5. Dr. R. Allyn Moser
6.
7. Jane Swenk
8. Mrs. Brookings
9. Mrs. Glen Chapman
10. Mrs. A.H. Jones
11.
12. Geo. Blinco
13. Mrs. A.M. Jones
14. Harold Benckessor
15. Edson Fichter
16. Levi Mohler
17. W.E. Eigsti
18. Allegra Collister
19. Florence Patton
20. Mrs. Geo. Blinco
21.
22. Doris Gates
23. Carol Kinch
24. Mrs. Herman Chapman
25.
26. Adrian Fox
27.
28. Bud Pritchard
29. David Damon
30.

Fig. 10. Nebraska Ornithologists' Union meeting, Chadron, Nebraska, 1982. Courtesy of the NOU Library and Archives.



1. Eileen Paine
2.
3. Iola Pennington
4. Mildred Gross
5. Carleen Pruess
6. Neva Pruess
7. Beth Baer
8. Sharon Alford
9. LeAnne Green
10.
11.
12. Loren Padelford
13. Clyde Johnson
14. Emma Johnson
15. Babs Padelford
16. Stan Longfellow
17. Everett Gross
18. Rusty Cortelyou
19. Margaret Cortelyou
20. ? Blinde
21. Joyce Brashear
22. Father Tom Hoffman
23. Gary Lingle
24. Doris Gates
25. Ruth Green
26.
27.

In recent years graduate and faculty research on the birds of western Nebraska has been greatly facilitated by the University of Nebraska's establishment of a biological field station near Ogallala, in Keith County. Many dissertations and publications have resulted, perhaps the most conspicuous of which have been the studies by Charles and Mary Brown (1996), on the costs and benefits of colonial nesting by Cliff Swallows (*Petrochelidon pyrrhonota*). After a long period of inactivity, the bird collection of the Nebraska State Museum is once again receiving active curating, largely through the efforts of Thomas Labedz. He has been adding several hundred specimens per year to the Museum's roughly 12,000 specimens. About 70 percent of these are from Nebraska, and the total includes some 3000 skeletons and about 1200 eggs. The earliest data specimen is from 1854, and some series begin in the 1880s. The largest numbers have been collected by Thomas Labedz (ca. 1000), followed by John T. Zimmer, at almost 800. About 300 each were obtained by Myron Swenk, Lawrence Bruner, and M. A. Carriker, Jr., and nearly 200 each were collected by George E. Hudson and Robert Wolcott. Besides the State Museum collection, there are about 1200 bird specimens at Wayne State College, Wayne, Nebraska, and a few hundred at the University of Nebraska at Omaha. The Hastings Museum has no reference collection, but its exhibits do include mounts of some rare Nebraska birds, especially Whooping Cranes.

Gary Lingle, a past president of the NOU (1983-1986), produced a bird-finding guidebook and checklist for the Platte Valley (1994). The birds of the Platte Valley and of the Nebraska Sandhills have also been separately documented in books (1984, 1996) by me, and my Nebraska checklist, originally produced in 1980, has been periodically revised and reprinted. A bird-finding guide to the state was also prepared (Johnsgard 1997), complementing a similar one by Knue (1997). A critically evaluated list of Nebraska birds was published by Tanya E. Bray, Barbara K. Padelford and W. Ross Silcock (1986). A book on the breeding birds of Nebraska (with an estimated 215 species breeding since 1960) was provided in 1988 by James E. Ducey, and a more comprehensive state bird book is in preparation by W. Ross Silcock, Joel Jorgenson, and Roger Sharpe. There is now even a NOU website on the Internet for reporting bird sightings, discussing Nebraska birds and exchanging NOU news (http://rip.physics.unk.edu/nou/).

BIRD-LIFE CHANGES

Avifaunal changes in Nebraska have also been great during this century. At the time the NOU was formed the Eskimo Curlew (*Numenius borealis*) was still a common migrant, and the Passenger Pigeon was to be seen in small migrating flocks. Yet, the Carolina Parakeet was by then probably already extirpated, and the Wild Turkey and Ruffed Grouse (*Bonasa umbellus*) had probably also virtually disappeared. The Swallow-tailed Kite (*Elanoides forficatus*), Bald Eagle, Osprey (*Pandion haliaetus*), Trumpeter Swan (*Cygnus buccinator*), Greater Sandhill Crane (*Grus canadensis tabida*), Pileated Woodpecker (*Dryocopus pileatus*) and Northern Raven were probably also gone as breeding birds by then as well. Several warblers, including the Blue-winged (*Vermivora pinus*), Prairie (*Dendroica discolor*) and Northern Waterthrush (*Seiurus noveboracensis*) also disappeared around the turn of the century as breeders, as well as the Sage Grouse (*Centrocercus urophasianus*), Northern Saw-whet Owl (*Aegolius acadicus*), Yellow-bellied Sapsucker (*Sphyrapicus varius*), and Baird's Sparrow (*Ammodramus bairdi*). The Red-shouldered Hawk (*Buteo lineatus*) was probably never common nor widespread as a Nebraska breeder, but was also barely hanging on by then. One of the last Eskimo Curlews to be collected in North America was shot near Hastings, in April of 1915; it had once been avidly hunted by market hunters. The Greater Prairie-chicken (*Tympanuchus cupido*) peaked and then began a gradual decline as natural grasslands increasingly gave way to croplands. The Lesser Prairie-chicken disappeared from Nebraska in the 1920s or 1930s, but breeding in the state was never documented.

The House Sparrow (*Passer domesticus*) was already well established in Nebraska by 1904, having been introduced into the United States in the early 1850s and arriving in Nebraska in the 1870s through releases by farmers who vainly hoped it might help control the locust plagues. The Rock Dove (*Columba livia*) arrived in North America with the earliest settlers of the 1600s, but records of its first Nebraska appearance are lacking. The Ring-necked Pheasant *(Phasianus colchicus)*was successfully introduced in 1909, and the Wild Turkey was re-introduced in the early 1960s. Gray Partridge (*Perdix perdix*) introductions were only marginally successful in northern Nebraska, and several other gamebird introduction attempts such as the Chukar Partridge (*Alectoris chukar*), Scaled Quail (*Callipepla squamata*), and Crested Tinamou (*Eudromia elegans*) were failures. The European Starling (*Sturnus vulgaris*) did not appear in eastern Nebraska until 1930, about 60 years after it was released in New York City. The House Finch (*Carpodacus mexicanus*) reached eastern Nebraska in the

1980s, some forty years after also having been released in New York. However, it was present in western Nebraska at least as early as 1919, and has slowly progressed eastwardly. The two populations have recently met along the Platte Valley. Other recent self-introduced arrivals include the Cattle Egret (*Bubulcus ibis*) in 1965, the Great-tailed Grackle (*Quiscalus mexicanus*) during the mid-1970s, and the Collared Dove (*Streptopelia decaocto*) unexpectedly appeared in the late 1990s.

The Trumpeter Swan resumed breeding in the northern Nebraska Sandhills in the late 1960s, as a result of re-introductions in nearby South Dakota. The Bald Eagle began nesting again in Nebraska during the 1980s, after recovering from the dismal DDT era. If provided with suitable nesting platforms, the Osprey would certainly also return. Eastern Bluebirds (*Sialia sialis*) and Tree Swallows (*Iridoprocne bicolor*) have likewise recently become fairly common in Nebraska through bird house erection and monitoring programs. Aided by restoration efforts, Canada Geese have become common breeders across the state, and Peregrine Falcons (*Falco peregrinus*) are also nesting locally again, through captive breeding and hacking programs. Under management efforts, Snow Geese (*Chen caerulescens*), Sandhill Cranes, and Whooping Cranes have also flourished.

The Chuck-will's-widow (*Caprimulgus carolinensis*) apparently invaded extreme southeastern Nebraska from Kansas by 1965, and has now reached the lower Platte Valley, and the Wood Duck has gradually moved westward across the entire state over the last few decades. Breeding American Woodcocks (*Scolopax minor*) have also moved west along the Platte Valley, to at least as far as Kearney. The growth of trees along our major waterways has improved foraging habitat and opportunities for east-west dispersal among not only these but many other woodland-dependent birds, while at the same time has reduced it for open water and bare shoreline-dependent species, such as cranes, Least Terns (*Sterna antillarum*) and Piping Plovers (*Charadrius melodus*).

The construction of dams and resulting reservoirs has increased surface waters in the state, and has much affected wintering and migration patterns of fish-eaters or other water-dependent species, such as waterfowl, eagles, grebes, and loons. Minimum flow rates for the Platte have been established, and many wetlands in the Rainwater Basin have come under protection, also helping water and shoreline birds. Milder winters have also allowed many migratory species that once rarely, if ever, wintered here to remain during milder years, at least in small numbers. Since the 1970s several species have been identified as threatened or endangered either statewide or nationally, such as Least Terns, Piping Plovers and Whooping Cranes, and efforts are underway to preserve them. As a result several new refuges or nature sanctuaries have been established, including two important migratory stopover sites for Sandhill and Whooping cranes along the Platte River.

At the same time many of our most spectacular grassland-dependent birds such as Burrowing Owl, Greater Prairie-chicken, Upland Sandpiper (*Bartramia longicauda*), and Long-billed Curlew (*Numenius americana*) have seriously declined, as have most of our grassland sparrows. Many Neotropical woodland-adapted migrants have also declined, whereas city-adapted and crop-dependent species such as Brown-headed Cowbird (*Molothrus ater*), Rock Dove, European Starling, American Crow (*Corvus brachyrhynchos*) as well as blackbirds and grackles have vastly increased and have sometimes become serious pests.

The past century's most obvious bird gains (European Starling, House Sparrow, Rock Dove, House Finch, Cattle Egret, Great-tailed Grackle, Chuck-will's-widow, American Woodcock, Ring-necked Pheasant), when balanced against the three extinctions (Passenger Pigeon, Carolina Parakeet, Eskimo Curlew) and the many extirpations of our breeding species (Ruffed Grouse, American Swallow-tailed Kite, Greater Sandhill Crane, Northern Saw-whet Owl, Yellow-bellied Sapsucker, three warblers, etc.) would seem to leave us both aesthetically and numerically poorer than we were at the turn of the past century. Our logo-species, the Burrowing Owl, may well disappear from Nebraska in the next few decades, and our State Bird, the Western Meadowlark, is also in decline.

Yet, skeins of Snow Geese still can etch a March Nebraska sky from dawn to dusk, prairie-chickens still annually greet the spring sunrises with their ancestral rituals, and the spine-tingling cries of Sandhill Cranes coming to roost on the Platte still bring with them distant echoes of thundering bison, trumpeting mammoths, and even of times before recorded time. We can still totally lose ourselves in their grace and beauty, imagining that we have discovered some other Eden, and hopefully resolving to act in such a way that these birds might still be able to cast their marvelous spells just as strongly on our descendants a century hence as they do today.

ACKNOWLEDGMENTS

I thank Linda Brown, Angie S. Fox, and Thomas Labedz for their help compiling the photographs, and acknowledge the University of Nebraska State Museum, which houses the NOU Library and Archives.

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